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A Phase I Inventory of Current EPA Efforts to Protect Ecosystems

Compiled by

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Introduction

About the Inventory

This Inventory includes summaries of projects that involve EPA and its partners in place-based management and ecosystem protection—an approach intended to integrate environmental management with human needs, consider long-term ecosystem health, and highlight the positive correlations between economic prosperity and environmental well-being. The purpose of this document is to let readers throughout EPA and outside the Agency know of the increasing amount and variety of ecologically oriented activities in which EPA is participating and the many places at which these activities are occurring. The Inventory was prepared under the direction of EPA's Ecosystem Protection Task Force.

The Inventory covers ongoing projects and was compiled from submittals by Regions, Headquarters Program Offices, and EPA Laboratories. Except for minor editorial changes, the summaries appear exactly as submitted. About half of these project summaries were submitted originally to the *Watershed Protection Approach 1993/94 Activity Report*, and the others were submitted in response to Task Force requests issued Agency-wide. The submittal process was voluntary and as a result the Inventory is not comprehensive.

The Introduction includes a brief description of the Inventory, background information about emerging EPA policies concerning place-based management and ecosystem protection, criteria for projects listed, and thoughts on revising and improving the Inventory over time. Following the Introduction, Part One summarizes EPA's largest ecologically oriented projects; these are large-scale initiatives that cover areas of at least 100,000 square kilometers. Part Two, which constitutes most of the report, is organized by EPA Region and includes summaries of ongoing, place-based projects at the local scale (less than 100,000 square kilometers). Part Three describes multi-site projects and programs, in which generally the same ecosystem-oriented activity is carried out at a number of places distributed throughout the Region or nation. A national map of local-scale and large-scale project locations appears on page 5, and a Region-specific map accompanies each Regional projects chapter. To allow each Regional chapter to stand alone, projects that extend across Regional boundaries are summarized under each Region in which they occur.

Guidelines for Listing Projects in This Inventory

Focusing on ecosystems and place-based management is new to EPA. Although many projects with an ecosystem component have been initiated, few of them involve comprehensive ecosystem assessment or management at this early stage. Thus, in developing this Inventory, the Agency's Ecosystem Protection Task Force decided to be more inclusive than exclusive of projects that are just beginning to apply the principles of a place-based, ecosystem protection approach. Although meeting or planning to meet the listing guidelines was important, it was

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long-term ecosystem health, and highlight the positive correlations between economic prosperity and environmental well-being.

On March 5, 1994, several of EPA's senior managers and scientists met in Edgewater, Maryland, to develop a strategy for realizing that goal. The workgroup described a vision for reorienting the Agency toward a "place-driven" focus; that is, the work of the Agency would be driven by the environmental needs of communities and ecosystems. For any given "place," EPA would establish a process for determining long-term ecological, economic, and social needs and would reorient its work to help meet those needs. Although this approach was already being demonstrated in a small number of places, the workgroup envisioned that, over time, the entire country would benefit from the approach.

The Edgewater Consensus workgroup agreed upon several actions, to be carried out in the near term, that would advance EPA toward its goal. Among other plans, the workgroup decided to develop this Inventory:

> *. . . headquarters and the regional personnel, supported by the Ecosystem Protection Workgroup, will conduct a "snapshot" review of the Agency's current efforts to protect ecosystems. As a part of the snapshot review, the Regional Administrators will inventory and evaluate ecosystem projects at a variety of scales across their region. Regions will work with other federal agencies, state and local agencies, private organizations, and citizen groups to identify places and set priorities. This review will include a discussion of what other agencies, private organizations and state, local and tribal governments are doing. Available inventories of ecosystem projects and background materials will be provided to support this effort.*

Future of the Inventory

This document represents the starting point for the Inventory and several related EPA Regional and Headquarters activities. As any ongoing inventory is never complete and always subject to updates, there is a plan for this Inventory to be open-ended and periodically revised to cover EPA's active place-based projects. The design of the Inventory, however, might change based on how this Phase I report is used and, based on its usage, whether a different format would appear to be more useful.

An interactive, electronic format for the Inventory might be appropriate as EPA moves toward widespread, regular use of its information systems. This Inventory report, for example, is currently available in hard copy or in electronic format on EPA's All-in-One Videotex (VTX) utility. Future updates of the Inventory might be exclusively electronic and distributed on disk or publicly accessible on VTX or EPA's various bulletin boards. Currently, however, VTX cannot display the Inventory's maps. A software package such as PC ArcView II could be used to integrate the Inventory's maps and project summaries into one interactive database. The geographic display or "view" capability would be useful to display an on-screen map of the

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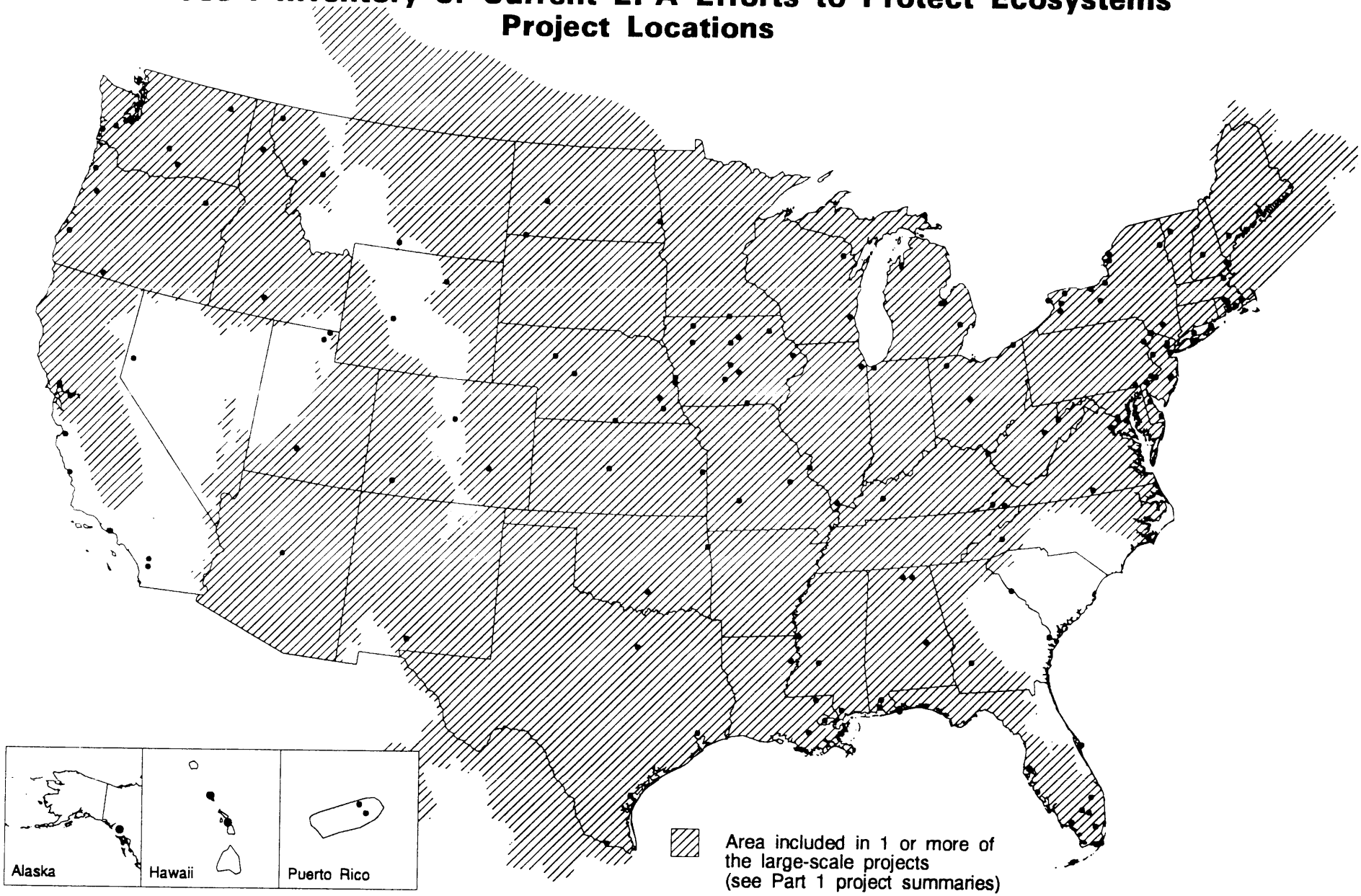
Figure 1:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Project Locations



Scale 1:20,000,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00008
Area boundaries and reference point locations are approximate.

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Part One:
Large-Scale Ecosystem Protection Efforts

considered equally important to encourage and involve parties throughout the Agency who have nominated sites and have shown an interest in supporting the ecosystem approach.

Agency personnel were provided the following guidelines about the kinds of projects considered suitable for the Inventory:

- **Place-based activity**. Above all, projects must focus on a specific place (or places) and the environmental characteristics, problems, and management needs of that place.

- **Ecosystem protection**. A significant element of the project should be the analysis of the ecosystem or major components of the ecosystem, or better yet, taking action to restore, enhance, protect, or improve the condition of the ecosystem. The best projects will focus on the functions of the whole system and its cross-media interrelationships although the project might take action on only a part of the whole.

- **Currently active project**. Because the Inventory is meant to reflect the current status of EPA's involvement in ecosystem protection and the places where this is occurring, it will be limited to projects now active or about to become active.

- **An EPA role**. EPA should have a defined role in the project, although this needn't be the lead role or even a "formal" role. The teamwork element is more important than whether EPA leads the project. EPA's involvement may include technical expertise, financial support, regulatory involvement, facilitation/advice, or other role.

- **Stakeholder involvement**. At least some parties outside EPA that have an interest in the place should be involved. EPA's partners might include other agencies on the local to international level, the scientific or academic communities, private enterprise, citizens' groups, or individuals.

- **Goals and assessments**. Ecosystem-related goals (as compared to purely human-welfare-related goals) should be identified. Better yet, the project includes an assessment that indicates some aspect of ecosystem condition and long-term sustainability.

Background: The Edgewater Consensus

The goal of EPA's ecosystem protection approach is to use a place-based approach to improve the Agency's ability to protect, maintain, and restore the ecological integrity of the Nation's lands and waters, which includes the health of humans as well as plant and animal species. This approach will integrate environmental management with human needs, consider

Part One:
Large-Scale Ecosystem Protection Efforts

The following pages summarize the largest of EPA's ecosystem projects, each covering over 100,000 square kilometers. Many of these large-scale projects are known as geographic initiatives. EPA's investment in these large-scale initiatives is considerable, often representing millions of dollars of annual funding, dedicated staff, and a long-term commitment. In these initiatives EPA has usually teamed with several partners, including other federal and state agencies, to make the project possible.

Another common characteristic of the large-scale projects is the focus on social, economic, and ecological concerns surrounding a large, complex, highly beneficial, and irreplaceable ecosystem. As in the case of the Chesapeake Bay watershed or the Great Lakes, the people of these areas identify with and value the ecosystem and its health and maintenance. For this reason, the larger initiatives have great potential as a model for integrating human and environmental concerns in place-based management.

The large-scale projects in the Inventory at this time include:

Atlantic Coastal Plain Aquifer System Project
Chesapeake Bay Program
Chesapeake Bay/Mid-Atlantic Highlands/Mid-Atlantic Landscape-Scale Assessments
Colorado Plateau Ecosystem Partnership Project
Colorado River Program
EMAP Northeastern Lake Assessment
EMAP Mid-Atlantic Highlands Stream Assessment
Great Lakes Program
Great Plains Program
Gulf of Maine Program
Gulf of Mexico Program
Interior Columbia Basin Ecosystem Project
Lower Mississippi Delta Initiative
Mid-Atlantic Highlands Program (MAHA)
Mid-Atlantic Integrated Assessment (MAIA)
New England Resource Protection Project
Pacific Northwest Ecosystem Management Research Initiative
Prairie Potholes/Missouri Coteau Ecoregion Assessment
Prairie Pothole Region (PPR) Ecosystem Assessment
President's Forest Plan (Pacific Northwest)
Rio Grande Basin Landscape-Scale Assessment
Rio Grande/Rio Bravo Watershed Project
San Francisco Bay/Sacramento-San Joaquin Delta Estuary

location and distribution of projects, while the relational database files could hold the project summaries. Users might wish to query the system for information on a specific project, a geographic area of interest, an ecosystem type or project type, stakeholder involvement, or other characteristic.

Regions might find it useful to expand this national Inventory and develop more detailed Regional inventories and databases on their ecosystem protection activities. For example, Region IX's Water Management Division is currently working with many stakeholders on a comprehensive, computerized inventory of watershed protection projects. More than 250 watershed projects are currently under way in this Region. Most of these involve EPA and are focusing to some degree on ecosystem protection. Region IX plans to use its inventory to assist in setting geographic priorities, targeting available resources to support projects in priority areas, and coordinating action with state, local, and other federal participants. In addition, Region IX has worked with project stakeholders to provide watershed management skills training based on in-depth case studies of selected watershed projects.

Like the Regions, the Agency as a whole will also need to determine whether a truly comprehensive Inventory is desirable. For example, because they are actions related to ecosystem condition, should every wetlands permit action, every Clean Lakes grant, or every endangered species consultation be included? Which national or Regional programs need the Inventory, and what data are most useful to them? How can ecological project data be integrated with other EPA databases currently in use? These and other design issues will be considered over the coming year as the Inventory is used and EPA's Regional and national programs gain experience in place-based management and ecosystem protection.

Atlantic Coastal Plain Aquifer System Project

Size and location: The project covers 246,000 square kilometers (95,000 square miles) in the following states: New York, New Jersey, Delaware, Maryland, Virginia, North Carolina.

Nature of EPA involvement:

- Interagency Agreement, U.S. Geological Survey (USGS), Principal Investigator Joseph Bachman, Conceptual Model Building and Database Support for Modeling Groundwater Systems in the Chesapeake Bay Region, 10/01/93-09/30/94, $80,000.
- Cooperative Agreement, University of Minnesota, Principal Investigator Otto Strack, Coastal Aquifer Modeling in High Performance Computing, 10/01/-94-09/30/96, $200,000.
- Cooperative Agreement, Indiana University, Principal Investigator Henk Haitjema, Threedimensional Unconfined Aquifer Modeling in High Performance Computing, Project Period: 10/01/94-09/30/96, $200,000.
- Project Officer: Stephen Kraemer, U.S. EPA Office of Research and Development, Robert S. Kerr Environmental Research Laboratory (ORD/RSKERL)-Ada. The Project Officer has an In-house Research Project supporting this effort, including an on-site contractor work assignment.
- High Performance Computing Contact: Joan Novak, U.S. EPA Office of Research and Development, Atmospheric Research and Exposure Assessment Laboratory (ORD/AREALRTP).

Organization that initiated project:

USEPA/ORD/AREAL-RTP, High Performance Computing Initiative

Major environmental problems: Coastal estuaries are threatened by land use practices that impact shallow ground water quantity and quality. The shallow ground-water system provides a hidden and slow-moving pathway for contaminants from source to discharge area. Both point and nonpoint sources of toxics and nutrients have a significant impact on the estuary ecosystems. Overpumping of aquifers can lead to saltwater intrusion along coastal areas.

Actions taken or proposed: High-performance computing tools are needed to support place-based decision making involving large ecosystems. An integrated, supra-regional scale ground water modeling system is being developed on massive parallel processing supercomputers using analytic element solution techniques and scientific visualizations. A demonstration is planned for the Atlantic Coastal Plain shallow aquifer system. The tool will potentially be applicable to the analysis of saltwater intrusion, nonpoint source pollution, hazardous waste site risk analysis, point source toxic loadings, and wellhead protection. Research project reports and a demonstration of the modeling system will result from the work.

Stakeholders:

States (New York, New Jersey, Delaware, Maryland, Virginia, North Carolina)
U.S. EPA
USGS
Chesapeake Bay Program

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The Exchange provides Chesapeake Bay communities with technical assistance teams. composed of experts from the United States, Canada, France, and the United Kingdom. The purpose of these efforts, which have focused on three regions—Virginia's Eastern Shore, Maryland's Chester River watershed, and Pennsylvania's Cumberland County—is to stimulate voluntary action to achieve local economic sustainability and the protection of community character and ecosystem values.

- Habitat Restoration: A series of habitat restoration projects address numerous problems. The removal of blockages and construction of fishways and fish elevators to create fish passages has reopened 280 kilometers (175 miles) of river to anadromous fish in the watershed. Oyster reefs have been created in various areas throughout the bay. The return of submerged aquatic vegetation (SAV) is inseparably linked to water quality improvement and nutrient reduction. Areas of the bay where SAV is now growing have increased by 75 percent since 1984. Interstate fishery management plans have been prepared and have assisted with the recovery of shellfish and finfish species such as the striped bass or rockfish.
- Federal Ecosystem Management: In response to the National Performance Review and Chesapeake Bay Program goals, an agreement was reached among 23 federal agencies to take a collaborative approach to fully implement new national directives on ecosystem management. The goals of the effort include promoting environmental restoration, preventing environmental degradation, promoting sustainable development, reducing costs, and maintaining the long-term health of the Nation's ecological systems.

Stakeholders: Chesapeake Bay Program ecosystem management involves all levels of government, the private sector, scientists, landowners, and citizens. In the bay region these interests are coupled with three governors, 40 members of Congress, thousands of state legislators and local elected officials, 13 federal agencies, 4 interstate agencies, and more than 700 citizen groups that play a role in the restoration effort. The formal Bay Program has established more than 50 subcommittees and work groups to ensure that all of the interests are represented and that the goals of the program are ultimately achieved.

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South Florida Geographic Initiative
Southern Appalachians Assessment (SAA)
Southern Appalachian Man and the Biosphere Reserve Area (SAMAB) Landscape-Scale Assessment
Southern Appalachian Mountains Initiative (SAMI)
Upper Midwest Initiative, Interagency Cooperation on Ecosystem Management (ICEM)

Southeastern Utah Association of Governments
U.S. Bureau of Land Management
U.S. EPA
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Upper Colorado River Commission
Western Area Power Administration
Western Network

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Chesapeake Bay Program

Size and location: The Chesapeake Bay's watershed covers 166,000 square kilometers (64,000 square miles) and encompasses parts of New York, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and the District of Columbia. The Chesapeake Bay is the Nation's largest and most productive estuary. The ecosystem contains the 320-kilometer-long (200-mile-long) Chesapeake Bay and 150 rivers, creeks, and streams, most of which flow through privately owned lands.

Nature of EPA involvement: The Chesapeake Bay Program is a cooperative effort of the states, the District of Columbia, and the federal government. In 1975 Congress directed EPA to undertake a comprehensive investigation into the causes of the Bay's decline. The research findings and recommended remedies led to the signing of the Chesapeake Bay Agreement. EPA, through the Chesapeake Bay Program Office, provides leadership, administrative, technical, financial, and information support to a network of regional committees, subcommittees, and work groups that runs the Bay Program. The Administrator of EPA represents the federal government within the agreement.

Organizations that initiated project: The Chesapeake Bay Agreement was signed in 1983, in response to action by the U.S. Congress, by the U.S. Environmental Protection Agency; the States of Maryland, Virginia, and Pennsylvania; the District of Columbia; and the Chesapeake Bay Commission. In that compact, the partners agreed to improve and protect water quality and living resources for the Chesapeake Bay estuarine system.

Major environmental problems: The Chesapeake Bay Agreement and its amendments include declarations of intent to respond to a series of ecosystem problems. These commitments focus on nutrient enrichment from all sources (including air deposition); population growth and development; habitat loss and degradation (including submerged aquatic vegetation); toxic substances; and interstate fishery management.

Actions taken or proposed: The Bay's ecosystem management approach relies on a network of protective agencies and private groups, voluntary actions, laws, and regulation. The regional framework focuses on the integration of all the component parts of the ecosystem, including the biological, physical, economic, natural, and cultural factors at play. Several examples of existing efforts include:

- Nutrient Reduction: The major initiative of the Chesapeake Bay Program concerns nutrient reduction. In 1987 the signatory jurisdictions agreed to reduce nutrients entering the bay by 40 percent by the year 2000 and retain those levels into the next century. The bay states and the District of Columbia have agreed to develop and implement tributary watershed specific nutrient reduction strategies in order to achieve nutrient loading targets. All of the jurisdictions have completed draft "Tributary Strategies" and are at different stages in the process of developing the final strategies.
- Toxics Management: The Chesapeake Bay's Basinwide Toxics Reduction and Prevention Strategy focuses on multi-jurisdictional efforts by directing reduction and prevention actions toward regions with known toxic problems—the Patapsco, Anacostia, and Elizabeth Rivers—as well as areas where significant potential exists for toxic impacts on living resources and habitats. Regional Action Plans are being developed for these three designated "Regions of Concern."
- Sustainable Development: In cooperation with The Countryside Institute, The Alliance for the Chesapeake Bay, and 30 other public agencies and private groups, the Chesapeake Bay Program has established the Cheasapeake Bay Region International Countryside Stewardship Exchange to encourage public and private collaboration on land conservation and community development within the ecosystem.

EMAP Northeastern Lake Assessment

Size and location: Northeastern United States, including the States of Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, and New Jersey.

Nature of EPA involvement: EPA (Office of Research and Development, New England Region, and Region II) designed the study and is analyzing the results.

Organization that initiated project:
EPA/ORD EMAP

Major environmental problems:
- Acidification
- Eutrophication
- Nonpoint source pollution

Actions being taken or proposed: EMAP monitoring teams measured a suite of indicators of ecosystem condition at a probability-based sample of lakes across the northeastern states in a monitoring study designed to assess the general condition of lakes across the region. The following data were collected on over 300 lakes in the northeast from 1991 to 1994:

- Biological Indicators or Measurements
  - Fish assemblages including exotic species
  - Riparian breeding bird assemblages
  - Zooplankton assemblages
  - Benthic Macroinvertebrate assemblages including exotic species
  - Sediment Diatom Assemblages
  - Trophic State Measures - chlorophyll a, total phosphorus, transparency
  - Aquatic macrophytes including exotic species
- Chemical measures
  - Fish tissue contaminants
  - Water chemistry - nutrients, suspended sediments, cations, anions, pH, Acid Neutralizing Capacity, temperature, Dissolved Oxygen
- Physical measures
  - Lake riparian habitat
- Watershed measures
  - Landcover - % agriculture, % forests, % urban, % wetlands, etc.
  - Road density
  - Human population density
  - Ecoregions
  - Geology
  - Fish stocking and management practices

Stakeholders:
EPA New England Region and Region II
U.S. Fish and Wildlife Service
States of Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey

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Chesapeake Bay/Mid-Atlantic Highlands/Mid-Atlantic Landscape-Scale Assessments

Size and location: The project area includes southern New York, southern and western New Jersey, Pennsylvania, West Virginia, Maryland, Virginia, northeastern North Carolina, Delaware, and Washington, DC.

Nature of EPA involvement: This part of EPA's Environmental Monitoring and Assessment Program (EMAP) will conduct assessments of status and trends of landscapes and medium-sized watersheds and relate findings to conditions in a wide number of aquatic and terrestrial resources. EMAP-Landscapes is conducting research on landscape pattern indicators that are derived from remote sensing and other existing data. Results from assessments will be useful in generating alternatives for ecosystem management and in conducting ecological risk assessments. For example, research relating landscape status and trends to stream ecological condition will help determine the scales at which ecological resources should be restored. EMAP-Landscapes proposes to use Landsat TM satellite data and 3-date Landsat MSS data to address landscape change.

Organization that initiated the project:
U.S. EPA EMAP

Major environmental problems: Degradation and alteration of critical ecological components and processes due to the magnitude and distribution of land uses have occurred over the Mid-Atlantic region. These alterations have affected several important ecological resources within the Mid-Atlantic region, including streams, wetlands, forests, estuaries, and breeding birds and other attributes of biological diversity. Landscape-scale processes that have been altered include fire, water flow and discharge, and extinction/-colonization. These alterations have resulted in declines in water quality and certain components of biological diversity and have increased the risk of pest outbreak and catastrophic flooding. However, the extent and distribution of these alterations across the Mid-Atlantic region are currently unknown. Further, no information is available on relative degrees of risk and scales of impairment.

Actions taken or proposed: EMAP-Landscapes is proposing two primary activities: (1) landscape indicator development, which can be applied to multiple-scale ecological assessments, and (2) an assessment of status and trends in landscapes as related to biological diversity and integrity, watershed integrity (water quality, quantity, and timing), and landscape resilience (the ability of a landscape or watershed to maintain options for ecological goods and services in the face of combinations of anthropogenic and natural disturbance). Landscape indicator research has already begun within the Mid-Atlantic region and will proceed through FY96. Starting in mid-FY95, EMAP-Landscapes will assess status and trends in landscapes and watersheds over the entire region. Part of this assessment will include relating individual ecological resources, including forest, streams, estuaries, and a variety of wildlife habitats, with landscape pattern at multiple scales. The outcome of this assessment should be a fundamental understanding of the scales at which landscape change influences different ecological resources. It is EMAP-Landscapes' hypothesis that different resources will have different scaling relationships with landscapes. This information will be key in understanding the range of risks influencing ecological resources, and in deriving approaches to improve existing conditions.

Stakeholders:
Desert Research Institute
General public
Individual States
National Biological Survey
Natural Resources Conservation Service
Oak Ridge National Lab
Tennessee Valley Authority
U.S. EPA EMAP
U.S. EPA Office of Water
U.S. EPA Region III
U.S. Geological Survey

Great Lakes Program

Size and location: By area, the Great Lakes constitute the world's largest area of surface fresh water (246,000 square kilometers/95,000 square miles, 23 quadrillion liters/6 quadrillion gallons), holding 18 percent of the world's supply). The five Great Lakes and their drainage areas encompass all or parts of eight states (New York, Pennsylvania, Ohio, Indiana, Michigan, Illinois, Wisconsin, and Minnesota) and the Province of Ontario.

Nature of EPA involvement: The EPA Great Lakes National Program Office (GLNPO) has responsibility for meeting the expanded Great Lakes toxics and nutrient monitoring and Control requirements under section 118 of the Clean Water Act, as amended, including responsibilities specified in the Great Lakes Critical Programs Act of 1990 (GLCPA) and U.S. commitments under the Great Lakes Water Quality Agreement (GLWQA) of 1978, as amended; and responsibilities under section 112 of the Clean Air Act amendments.

Organization that initiated project: The Great Lakes National Program Office (GLNPO) steers and coordinates a consortium of local, state, federal, and nongovernmental organizations in ecosystem management and priority setting. The Great Lakes 5-Year Strategy, developed jointly by GLNPO and its multistate, multiagency partners and built on the foundation of the Great Lakes Water Quality Agreement with Canada, provides the agenda for Great Lakes ecosystem management.

Major environmental problems:

- Contaminated fish and wildlife
- Contaminated bottom sediments
- Threatened habitats ("endangered" or "threatened" classification for 52 species of plants and animals within the region)
- Non-native species (More than 130 non-native species have been introduced to the Great Lakes since 1800; recent invaders include zebra mussels and river ruffe)
- Vulnerable native fish populations
- Excessive phosphorus

Actions taken or proposed: Federal, state, and tribal partners developed the Great Lakes 5-Year Strategy to jointly address the problems of the Great Lakes ecosystem. The strategy focuses on three overarching goals: reducing releases of toxicants to the environment, protecting and restoring habitat, and protecting human/ecosystem species health.

In 1989, in recognition of the vulnerability of the Great Lakes to bioaccumulative chemicals, EPA and the states began the Great Lakes Water Quality Initiative, a precedent-setting, cooperative effort to establish common regulatory practices for the Great Lakes waters. Proposed guidance for minimum water quality standards, antidegradation policies, and implementing procedures was published in the *Federal Register* in April 1993.

Pursuant to a Great Lakes Pollution Prevention Action Plan, launched by EPA and the Great Lakes states in 1991, source reduction projects are under way with the auto and printing industries. Under the National 33/50 Program, Great Lakes manufacturers have already surpassed the Agency's interim 33 percent reduction goal.

In 1993, EPA and its partners initiated a Virtual Elimination Pilot Project to analyze opportunities for achieving virtual elimination through source reduction of targeted pollutants. Two pollutants, polychlorinated biphenyls (PCBs) and mercury, have thus far been selected for analysis.

Sediment cleanups are being accomplished at numerous sites across the basin under EPA's regulatory authority. Examples include the December 1992 Gill Creek cleanup of 5000 cubic meters (6500 cubic yards) of PCB-contaminated sediment (eliminating 20 percent of total annual PCB load to Lake Ontario through the Niagara River); the 1990-93 Waukegan Harbor Superfund removal of over 1 million pounds of PCB-contaminated sediment; and multimillion-dollar consent decrees in northwest Indiana requiring sediment characterization and cleanup. As a follow-up to the completed Assessment and Remediation of Contaminated

Colorado Plateau Ecosystem Partnership Project

Size and location: Region covered by western Colorado, southeastern and southern Utah, northern Arizona, and northwestern New Mexico.

Nature of EPA involvement: EPA is participating as a partner with other federal agencies and state, tribal, and local organizations (public and private).

Organizations that initiated project:
EPA and the National Park Service (NPS)

Major environmental problems:
- Conflicts between economic and environmental interests

Actions taken or proposed:
- Execution of Interagency Agreement in August 1994 between EPA and NPS, Rocky Mountain Region.
- Colorado Plateau Forum Steering Committee - Consortium of more than 20 entities representing federal, state, local, and private interests that joined together to plan and host a Town Hall meeting on "The Future of the Colorado Plateau: Choice or Chance?" in Moab, Utah, March 3-4, 1995.
- Meeting of interested researchers in May 1994 to determine who is doing what type of research, where, and how on the Colorado Plateau. This resulted in the expression of interest by the National Biological Survey (NBS) - Social, Economic, and Institutional Section in pursuing research on the Colorado Plateau as an ecosystem.
- Agreement with NBS - Colorado Plateau Research Unit to serve as lead in developing, storing, and making available the ecological information.
- Commitment from NBS - Social, Economic, and Institutional Section to three complete fiscal years of research on the Colorado Plateau at $1.225 million.
- Development of a draft discussion paper in the National Park Service on the principles of ecosystem management.
- Development of a draft vision/strategy for implementing ecosystem management in the Rocky Mountain Region.
- Development of a draft "cluster organization report" for the Colorado Plateau Cluster, which incorporates some of the principles of ecosystem management as well as the elements of the NPS Restructuring Document.
- Commitment by NPS to fund a bibliography of gray literature on the Colorado Plateau with a value of $85,000.
- Commitment by NPS and Northern Arizona University to fund a needs assessment of Park Units on the Colorado Plateau, valued at approximately $50,000.
- Commitment by NPS to fund research on the Mexican Spotted Owl, an indicator species on the Colorado Plateau, valued at $238,000.
- Commitment by NPS to fund EPA's efforts to prepare audit procedures that can be executed by students to evaluate the effectiveness of pollution prevention training.

Stakeholders:
City of Farmington
Colorado River Energy Distributors Association
Economic Development District of Southwest Colorado
Five County Association of Governments
Grand Canyon River Guides
Grand Canyon Trust
Grand County Commission
Hopi Tribe
National Park Service
Northern Arizona Council of Governments
Northern Arizona University
Northwest New Mexico Council of Governments
San Juan Forum

and restoration.

- CitySpace—developing open space policies for empty Chicago lots, through which lots will be redeveloped into parks and garden space for residents.

Partners in initiative projects will include TNC, local school districts, park districts and forest preserves, U.S. Forest Service, USFWS, and many others.

Actions to control introductions of nonnative species include Coast Guard requirements for mandatory ballast water exchange, EPA regulation of chemical control, USFWS and state testing of control techniques, and National Oceanic and Atmospheric Administration educational efforts.

Stakeholders:

23 Indian tribes
Department of the Interior (National Park Service and National Biological Survey)
Forest preserves
Great Lakes Fisheries Commission
Illinois
Indiana
Industry
Labor
Local citizens
Local school districts
Michigan
Minnesota
National Oceanic and Atmospheric Administration
New York
Nongovernmental organizations
Ohio
Park districts
Pennsylvania
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
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Colorado River Program

Size and location: The Colorado River basin covers about 632,000 square kilometers (244,000 square miles) in seven states including west-central Colorado, eastern Utah, western Arizona, southwestern Wyoming, southeastern Nevada and California, and western New Mexico.

Nature of EPA involvement:

- Technical assistance
- Participation in Coordination Groups
- Approvals of salinity standards
- Funding in limited situations
- NPDES permits issued with salinity limits

Organization that initiated project:

U.S. Congress

Major environmental problems:

- Increasing salinity levels in the river and the effects on agricultural soils in Arizona, California, and Mexico and on municipal/industrial water supplies in Nevada, Arizona, and California
- Loss of wetlands

Actions taken or proposed: Colorado River salinity standards, including a plan of implementation and numeric criteria, were developed by the states and approved by EPA. The plan of implementation is designed to maintain the salinity concentrations at or below the numeric criteria established at three lower basin monitoring locations and to meet commitments to Mexico. The plan of implementation includes policies used in all basin states for implementing the salinity standards through the National Pollutant Discharge Elimination System permit program and salinity control projects implemented through federal and state funding primarily in the upper basin states. Because improved irrigation systems for salinity control on agricultural lands can dry up existing irrigation-induced wetlands, mitigation of wetland losses is required for Bureau of Reclamation salinity control projects. The U.S. Department of Agriculture manages a voluntary wetland replacement program for its salinity control program.

Salinity control activities are coordinated through an Interagency Salinity Control Coordinating Committee; the Colorado River Basin Salinity Control Forum, composed of representatives of the seven basin states; and other committees.

Stakeholders:

Citizens of Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming
Mexico
State wildlife agencies
U.S. Department of Agriculture
U.S. Department of the Interior
U.S. Environmental Protection Agency

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than 70 percent of short grass prairie remain, scattered in islands; less than 10 percent of central flyway rainwater basin wetlands remain.

- Devastating floods as a result of structural alteration of stream channels and draining of wetlands.
- Declining ground water resources. The largest fresh water body in the world, the Ogalalla aquifer lying beneath the Great Plains, has lost 3-30 meters (10-100 feet) of depth to the water table in last 30 years from pumping for irrigation.
- Excessive use of pesticides and nutrients (e.g., median concentration of atrazine in streams exceeds EPA's Maximum Contaminant Level (MCL)).
- Loss of rural population and declining rural economies - 50 percent rural population decline 1940-1970; an additional 80 percent drop 1970-1980 and remaining rural population are aging.
- Loss of natural areas, wildlife, and other aesthetic values, making economic potential for tourism vulnerable.
- Threats from global climate change - Intergovernmental Panel on Climate Change anticipates that by 2030, warming trends in Central North America could result in temperatures considerably higher than historical records.

Actions taken or proposed: Beyond the conduct of its base programs, EPA Region VII has invested its resources in four areas. Grants or cooperative agreements have been employed to stimulate a broad partnership base through these activities:

- Policy and Partnership Development - Convening federal, state, and local agencies, academic organizations, and private stakeholders in science and policy forums on the Great Plains ecosystem to promote consensus on vision and strategy; grants to the Western Governors' Association to stimulate state action and stakeholder buy-in; designation of a small, core EPA staff to bring consistent, senior leadership to the effort. In the future, EPA plans to add a component to the GPP that will evaluate existing public policies in various places in the Plains to determine whether legislative or administrative changes are needed to be conducive to sustainable human activity.
- Science and Data - EPA has sponsored The Nature Conservancy in a rigorous program to identify species and habitat at risk, resulting in the designation of "action areas," which will help prioritize the place-driven work of the program. Together with Ord, Region VII has launched a project to collect and integrate environmental and other resource data from multiple public and private sources, and to make that information accessible to all stakeholders. This project supports a wide partnership of international and domestic agencies, organized by EPA to share data on the state of the Great Plains. A first-cut "data atlas," developed by Region VII's Office of Integrated Environmental Analysis, demonstrates the power of integrating and geographically displaying these data. An EPA-funded agreement with the U.S. Geological Survey (USGS) will further the ability to understand the dynamics of the hydrological systems of the Plains. And, the Region is working with its research partners to refine and in some cases develop models that will enable better assessment of environmental status and selection of management strategies. EPA plans to continue to foster the development of tools and information that will support decision-making at multiple levels.
- Education and Outreach - Through a series of seed grants, EPA Region VII is encouraging development of educational programs designed to enhance public appreciation and awareness of

EMAP Mid-Atlantic Highlands Stream Assessment

Size and location: Mid-Atlantic Highlands, covering the States of Delaware, Pennsylvania, Maryland, Virginia, West Virginia.

Nature of EPA involvement: EPA (Office of Research and Development and Region III) designed the study, is collecting the data, and is analyzing the results

Organization that initiated project:
EPA/ORD EMAP and Region III

Major environmental problems:
- Acidification
- Habitat alteration
- Nonpoint sources of pollution

Actions being taken or proposed: EMAP monitoring teams measured a suite of indicators of ecosystem condition at a probability-based sample of streams across the mid-Atlantic states in a monitoring study designed to assess the general condition of streams across the region. This study collected the following information on approximately 500 stream locations during 1993 to 1994:

- Biological Indicators or Measurements
  - Fish assemblages including exotic species
  - Benthic Macroinvertebrate assemblages including exotic species
  - Periphyton Assemblages
  - Sediment microbial respiration
- Chemical measures
  - Fish tissue contaminants
  - Water chemistry - nutrients, suspended sediments, cations, anions, pH, Acid Neutralizing Capacity, temperature, Dissolved Oxygen
- Physical measures
  - Stream physical habitat
  - Riparian habitat
- Watershed measures
  - Landcover - % agriculture, % forests, % urban, % wetlands, etc.
  - Road density
  - Human population density
  - Ecoregions
  - Geology
  - Fish stocking and management practices

Stakeholders:
EPA Region III
States of Delaware, Pennsylvania, Maryland, Virginia, West Virginia
U.S. Fish and Wildlife Service

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Gulf of Maine Program

Size and location: The Gulf of Maine is the body of water bordered by Massachusetts, New Hampshire, Maine, New Brunswick, Nova Scotia, and extending seaward to Georges Bank and Brown Bank. This covers more than 130,000 square kilometers (50,000 square miles) of water and is drained by an equally massive watershed.

Nature of EPA involvement: EPA has been a member of the Gulf of Maine Working Group for more than 5 years and has undertaken projects to support the program. EPA's involvement will increase in FY95, in response to the $1.9 million Congress appropriated for the Gulf of Maine Program.

Organizations that initiated project: The states and provinces that border the Gulf of Maine initiated the project, and the program's governing body (the Gulf of Maine Council on the Marine Environment) is still composed principally of state and provincial agencies.

Major environmental problems: Given the size of the waterbody, it is no surprise that major environmental problems run the gamut from toxics and bacterial contamination to nutrient enrichment, habitat destruction, and overfishing. The problems on which the program has focused most to date include contaminants from point sources, marine debris, and the identification of critical habitats. In the coming years, the program will focus most on habitat protection.

Actions taken or proposed: The program has undertaken a number of projects, including a pilot multijurisdictional monitoring program, a marine debris control program in a few ports, preparation of an inventory of contaminant loading from point sources, and identification of critical habitats. The program has also conducted a number of workshops on a variety of subjects, ranging from aquaculture to public outreach.

Stakeholders:

State, provincial, federal agencies
Marine science institutions
A limited number of nongovernmental organizations

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Sediments program, GLNPO is supporting states with contaminated sediment characterization and assessment as the necessary first step in remediating contaminated sediments. Air toxics monitoring stations have been established on each of the Great Lakes to collect data on nutrients, toxic metals, and organic contaminants. Two years of intensive monitoring of air, water, sediments, and biota began in 1994 on Lake Michigan. From such work, EPA and its partners will design load reduction strategies.

EPA, Environment Canada, the states, and the Province of Ontario announced the Lake Superior Binational Program in 1991, one aspect of which is the designation of nine bioaccumulative pollutants for "zero discharge." The program will also identify beneficial use impairments and restore and protect the basin's ecosystem.

The watershed approach that EPA and its partners are promoting in Lakes Ontario, Superior, and Michigan is embodied in the Lakewide Management Plans (LaMPs) for each of these lakes. A similar effort has commenced in Lake Erie and will be taken for Lake Huron. In addition, Remedial Action Plans are being developed and implemented on a smaller "watershed" level for the 43 Great Lakes Areas of Concern.

EPA is working with its partners, including U.S. Fish and Wildlife Service (USFWS), states, tribes, and The Nature Conservancy (TNC), to restore and protect habitat within the Great Lakes consistent with a TNC report, *The Conservation of Biological Diversity in the Great Lakes Ecosystem: Issues and Opportunities.* The report, funded in part by EPA, identifies important habitat for achieving biological diversity and ecological integrity in the Great Lakes ecosystem. GLNPO has funded some 70 habitat protection/restoration projects over the last 3 years. Projects are under way at locations such as Hamilton Lake/Fish Creek, Kakagon/Bad River Sloughs, the Maumee River, Allouez Bay, Irondequoit Bay, Black River, St. Louis River, Saginaw Bay, and Green Bay. These demonstrations reflect a variety of activities including on-the-ground restoration, public participation, and education. GLNPO can provide information regarding each of these efforts upon request; however, the following project summaries best illustrate the watershed work GLNPO is currently supporting:

- Hamilton Lake/Fish Creek (Steuben County, Indiana) combines wetland restorations by USFWS, agricultural land treatment practices through the U.S. Department of Agriculture and its state and local partners, and actions of TNC. Resultant actions will improve habitat for species of mussels (some endangered) and fish.
- Kakagon/Bad River Sloughs Watershed Demonstration Project (involving the Bad River Band of the Chippewa Nation and TNC) centers around a 6500-hectare (16,000-acre) wetland complex—the largest undeveloped wetland complex on Lake Superior. The project will protect and restore fish spawning ground and a waterfowl marsh inhabited by numerous rare species; model restoration and protection for more profoundly disturbed sites; explore sustainable development possibilities for the watershed; and demonstrate possibilities for ecologically viable activities.

The Glacial Lake Chicago Crescent, a multifaceted initiative in northeast Illinois and northwest Indiana emphasizing sustainable economic development, is another major project that is currently under way. This initiative includes:

- A Housing and Urban Development/ EPA Demonstration Project to rehabilitate vacant buildings for housing and reuse empty lots for native garden projects.
- TNC's Mighty Acorn Project, which incorporates in-the-field education about ecological processes including hands-on restoration for children.
- Organization by the Indiana Nature Conservancy, working with the Illinois Nature Conservancy field office, of a volunteer stewardship network to encourage public participation in stewardship of northwest Indiana natural area sites requiring ecological protection

Gulf of Mexico Program

Stakeholders:

- Agriculture
- Development interests
- Environmental organizations
- Fisheries
- Local and state governments in Florida, Alabama, Mississippi, Louisiana, and Texas
- Manufacturing and mining
- National Oceanic and Atmospheric Administration/National Marine Fisheries Service
- Natural Resources Conservation Service
- Other cooperating agencies
- Public deriving food, recreation, and income from the Gulf of Mexico
- Tourism
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Food and Drug Administration

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Great Plains Program

Size and location: The Great Plains span America's heartland and encompass parts of 13 states (Iowa, Kansas, Missouri, Nebraska, Oklahoma, Texas, New Mexico, Colorado, Wyoming, North Dakota, South Dakota, Montana, Minnesota), 3 Canadian provinces (Manitoba, Saskatchewan, Alberta), 4 EPA Regions (V, VI, VII, and VIII) and lands under the jurisdiction of over 60 Native American tribes. The area is bounded on the west by the Rocky Mountains, on the east by the Mississippi River valley and eastern deciduous forests, and on the north and south by the former extent of grasslands.

The Great Plains ecosystem was once the largest grassland on earth, covering over a million square miles. Today, many linkages continue to exist within this vast area—among natural communities, people, cultural, historical and political traditions and economy. There are also common challenges—for environmental protection, economic development, and future human well-being.

Nature of EPA involvement: EPA is involved in the Great Plains region at two scales. The first is on-the-ground, at the community level, as a catalyst for programs that integrate protection of human health and the environment within the Plains states through place-based environmental management, common sense, innovation, sound science, and partnerships. Currently, EPA is focusing efforts on two priority places—the Platte River Watershed and the Omaha Stretch of the Missouri River. EPA is also working at the landscape scale in partnership with others to define indicators, to monitor the health of ecosystems, to develop tools for sharing data and information, and to facilitate forums that develop strategies for sustainable development. Region VII is the lead Region in concert with Regions VI and VIII. A Great Plains Program (GPP) Office is located in Region VII.

EPA is also a leader in the Great Plains Initiative (GPI), a broad-based coalition of government agencies, other public organizations, industry, and the public whose goal is to draw attention to issues of biodiversity and sustainability in the Great Plains region and provide for coordination of response in priority areas.

Organization that initiated project: EPA initiated its Great Plains Program to address the environmental threats to people and places that were recognized during the 1990 Comparative Risk Assessment. The Plains were selected as a geographic region because they offer an opportunity to act before a crisis develops and because they offer a unique opportunity to address an interconnected set of scientific and policy considerations in the context of sustainable economy and environment.

The Western Governors have recognized the importance of addressing sustainability of natural resources and economy throughout the Great Plains region and organized the GPI to cooperatively develop new tools and management strategies to meet emerging needs. The Western Governors' Association coordinates GPI activities with state and provincial governments and among the various GPI partners.

The White House Interagency Task Force on Ecosystem Management has also recently designated the Great Plains as one of three regional "laboratories" in the country in which policy makers, scientists, resource managers, and private citizens will test new strategies for managing and protecting the environment. The U.S. Department of Agriculture is the lead federal agency for this component. All three efforts are complementary in scope and purpose.

Major environmental problems:

- Diminished water quality induced by toxins from industrial and agricultural sources and sediments from poor land management practices.
- Loss of soil productivity from erosion of topsoil, changes in pH from irrigation practices, and overgrazing.
- Loss of biodiversity - 214 threatened or endangered species, more than a 50 percent decline of endemic songbird species, more than a 75 percent decline of grassland nesting birds, epidemic diseases in waterfowl.
- Loss of contiguous natural landscapes - patches not large enough to support native or migratory species; less than 1 percent of native tall grass and less

Lower Mississippi Delta Initiative

Size and location: The Lower Mississippi Delta Alluvial Plain spans 1100 kilometers (700 miles) from southern Illinois to the mouth of the Mississippi River, a 219-county, 7-state area (Arkansas, Illinois, Kentucky, Louisiana, Missouri, Mississippi, and Tennessee). It is one of the largest watersheds in the world.

Nature of EPA involvement: Cosponsor of a Delta technical conference on agricultural/ environmental issues, opportunities, and technology transfer in 1996 with the U.S. Department of Agriculture (USDA), U.S. Department of the Interior - National Biological Survey (USDI-NBS), U.S. Fish and Wildlife Service (USFWS), and U.S. Geological Survey (USGS). State agencies, nonprofit conservation groups, and philanthropic organizations will also participate. EPA serves on the Steering Committee - Lower Mississippi Valley (LMV) Natural Resource Partnership. EPA Region VI has gained EPA Headquarters approval of a sustainable development proposal for the Delta entitled "Sustainable Agriculture and Sustainable Environmental Quality in Impoverished Rural Communities," which was selected as one of 12 projects by the President's Council on Economic Development. Grant projects to address land and water resources data management and networking, including a geographic information system (GIS), are also in progress.

Organizations that initiated project:

U.S. Environmental Protection Agency
National Biological Survey
U.S. Fish and Wildlife Service
The Nature Conservancy

Major environmental problems:

- Historic conversion of bottomland hardwoods to agriculture
- Loss of habitat and reduction in biodiversity
- Nonpoint source pollution
- Toxic contamination
- Loss of flood control functions

Actions taken or proposed: A delta-wide conference is being planned through the leadership of the National Biological Survey. It will focus on wetland restoration, water quality protection, and agricultural management practices. The Lower Mississippi Delta has been named as the Number 1 priority ecosystem for study and remediation by the U.S. Fish and Wildlife Service. A delta technical forum is planned for January 1996 with many delta participants.

An EPA Region VI proposal entitled "Sustainable Development Strategy - Lower Mississippi Delta" was selected under the President's Council on Sustainable Development. This project will specifically focus on empowerment within impoverished minority communities to contribute to environmental remediation and planning in the delta.

For 1995, The Nature Conservancy is developing a large data network plan (geographic information system-based) for the delta region through partnerships with existing state systems and the University of Arkansas.

In addition, EPA Region VI is providing financial support for an interagency spatial information workshop to be hosted in 1995 by the Lower Mississippi Delta Development Center and the Lower Mississippi River Conservation Committee in Memphis, Tennessee. Objectives of the workshop will include state-by-state (AR, IL, KY, LA, MO, MS, TN) discussions of ongoing and planned geographic information system (GIS) projects, development of an interstate communication network, and planning for the integrated collection, transfer, sharing, and analysis of natural resource spatial data needed to address environmental issues and to make informed management decisions.

EPA Region VI has collaborated with Region IV in support of a July 1994 meeting between the Regional Administrators of Regions VI and IV to work jointly to fund data collection efforts and encourage the development of a centralized GIS in the Lower Mississippi Delta. Development of a GIS-based model is vital for targeting bottomland hardwood wetland restoration zones based on pollution prevention and habitat restoration. A Regional Applied Research Effort (RARE), "Development of a Geographic Information System Data Network for Natural Resources Conservation in the Lower Mississippi Alluvial Valley," will be submitted

the Great Plains resources and environmental threats to that ecosystem. The EPA-sponsored H2Omaha Initiative will increase student awareness of the Missouri River by using the river and its Omaha area watershed as a living laboratory for science education in local school districts. EPA is also working with the National Wildlife Federation to develop teaching tools about Great Plains natural resources. EPA plans to continue outreach activities including using focus groups to learn how citizens on the Plains think about environmental issues, assisting with state-led public awareness campaigns, and sponsoring development of user-friendly data networks.

- Places - Region VII is currently concentrating its sustainable ecosystem effort on two visible and threatened places: the Central Platte River and the Omaha stretch of the Missouri River system. As one of many partners and stakeholders, EPA is delivering its expertise, tools, and resources to these place-based environmental initiatives. EPA Regions VI and VIII are participating, and in some cases leading, similar experiments in environmental management focused on other places in the Great Plains. Future efforts include joining a select number of interdisciplinary teams to provide EPA expertise and resources for carrying out place-based programs.

Stakeholders:

13 Great Plains States
Environment Canada
International Coalition for Land and Water Stewardship
National Association of Conservation Districts
National Farmers' Union
Provincial governments
U.S. Department of Agriculture
U.S. Department of Defense
U.S. Department of the Interior
U.S. Environmental Protection Agency
The Great Plains Agriculture Council
The International Fish and Wildlife Association
The Nature Conservancy
The Western Governors' Association
Tribal leaders

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Mid-Atlantic Highlands Program (MAHA)

Size and location: The Highlands study area encompasses approximately 168,000 square kilometers (65,000 square miles) of oak-hickory forests and upland areas, which include six major watersheds in the States of Pennsylvania, Maryland, Virginia, and West Virginia. The MAHA represents many unique terrestrial and aquatic ecosystems that extend east to west from the Blue Ridge Mountains to the Ohio River and north to south from the Pennsylvania-New York state boundary to the Virginia-North Carolina/Tennessee state boundaries.

Nature of EPA involvement: EPA Region II, with EPA's Office of Research and Development (ORD) and states, has initiated a multiyear program of data collection, analysis, and assessment on ecological condition of MAHA air, land, and water resources, as well as identification of sensitive areas and species at risk. Through goal setting, the use of environmental indicators, and interpretation and analysis of data, Region IV and ORD with state partners will be positioned to determine the relative risk of various threats to the ecosystems so that sound environmental management decisions can be made. The program will provide the tools to focus on our new imperative—ecosystem management.

Organization that initiated project:

EPA Region III and Office of Research and Development

Major environmental problems:

- One of highest rates of acid deposition in United States resulting in acid streams
- Coal mining impacts such as erosion, silting, and acid damage
- Nonpoint source runoff from agriculture and logging
- Landscape patterns of change from construction of new resort communities and increase in population in general
- Habitat loss/change

Actions taken or proposed: The MAHA products are intended to support:

- Establishing environmental priorities based on risk.
- Ranking problems according to severity.
- Establishing in-stream goals for clean-up activities.
- Evaluating effectiveness of water quality criteria and best management practices.
- Establishing optimum environmental conditions (reference conditions) to serve as goals for preservation, restoration, and remediation.
- Mapping areas of special concern.
- Identifying areas conducive to joint action with states, other federal agencies, and private organizations.

Stakeholders:

MAHA Coordinating Council (EPA Chair) - consortium of 10 federal agencies to support a collective and more holistic advocacy for the management and protection of MAHA's natural resources

States of Maryland, Virginia, Pennsylvania and West Virginia

The Nature Conservancy

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Gulf of Mexico Program

Size and location: The Gulf of Mexico, an area of 1.63 million square kilometers (630,000 square miles), abuts five Gulf Coast states and has a watershed area of 4.69 million square kilometers (1.81 million square miles) in the United States. About two-thirds of the total area of Mexico is also within the Gulf watershed area.

Nature of EPA involvement:

- Original program concept
- Lead agency for program
- EPA is the single largest source of funding for the program
- EPA has lead roles in a number of the program's committees, and a participatory role in the others.

Organization that initiated project:

U.S. EPA

Major environmental problems:

- Loss of coastal wetlands and seagrass beds
- Endangered commercial and recreational fisheries and shellfish beds
- Nutrients
- Toxic substances
- Pathogens
- Trash on beaches
- Impaired coastal habitats that support migratory birds, fish, and other living resources

Actions taken or proposed:

Accomplishments to date include:

- Developed a program infrastructure and 5-year plan that ensures a common cooperative approach between all local, state, and federal agencies with legislative or administrative responsibility for any portion of the environmental health of the Gulf. The plan has been signed by the Gulf state governors and cooperating agency heads.
- Funded demonstrations to use wetlands for filtration of domestic, agricultural, and urban wastewater to reduce impacts on shellfish-growing waters in several locations.
- Organized biannual beach cleanups that remove as much as 1 ton of trash per mile.
- Facilitated restoration of 240 hectares (600 acres) of coastal habitat in cooperation with the Tampa Bay Estuary Program and the State of Florida.
- Developed technical background information and promoted special area designation under MARPOL Annex V for the Gulf of Mexico (Wider Caribbean).

Within the next 5 years, through an integrated effort that complements existing local, state, and federal programs, the program has pledged to:

- Significantly reduce the rate of loss of coastal wetlands.
- Achieve an increase in Gulf Coast seagrass beds.
- Enhance the sustainability of Gulf commercial and recreational fisheries.
- Protect human health and food supply by reducing input of nutrients, toxic substances, and pathogens to the Gulf.
- Expand public education/outreach tailored for each Gulf Coast county or parish.
- Ensure that all Gulf beaches are safe for swimming and recreational uses.
- Reduce by at least 10 percent the amount of trash on beaches.
- Increase Gulf shellfish beds available for safe harvesting by 10 percent.
- Reduce critical shoreline erosion
- Improve and expand coastal habitats that support migratory birds, fish, and other living resources.

Descriptions of two specific projects that are being carried out by the Gulf of Mexico Program follow.

Mid-Atlantic Integrated Assessment (MAIA)

A five-step process will be used to develop a State of the Region report. The first step will be to identify the management questions that must be addressed to ensure that the report is a useful planning tool. MAIA can produce useful information only by applying data and methods that address the questions of concern to the relevant audience (i.e., environmental and resource managers). Identifying pertinent questions will involve convening focus groups of stakeholders and ensuring that they interact with EMAP scientists who are experienced in translating generic management questions into scientific questions that can be addressed via hypothesis testing.

Step 1. Identify management questions and translate them into scientific questions.

Step 2. Identify, collect, and manage data from multiple sources.

Step 3. Analyze data and develop needed indicators and methods.

Step 4. Synthesize and interpret results in a risk assessment framework.

Step 5. Present results and facilitate their incorporation into management decisions.

Stakeholders: The audience for MAIA includes a diverse group of stakeholders. ORD's Integrated Ecosystem Protection Research Program (including EMAP), Region III, and the states (New York, New Jersey, Pennsylvania, West Virginia, Maryland, Delaware, Virginia, and North Carolina) will directly utilize the results. Other interested agencies include EPA Regions II and IV; EPA policy and program offices (e.g., Office of Policy, Planning and Evaluation; Office of Water; Office of Administration and Resources Management; Office of Prevention, Pesticides, and Toxic Substances); other federal agencies (e.g., U.S. Department of Agriculture Forest Service and Agricultural Research Service; U.S. Department of the Interior Bureau of Land Management, National Biological Survey, and Fish and Wildlife Service; Department of Commerce National Oceanic and Atmospheric Administration); regional and interstate programs and authorities (e.g., river basin commissions, regional planning authorities); local agencies; and academic and policy research institutions. The remaining stakeholders include Congress, nongovernmental environmental organizations, private entities, and the public.

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Interior Columbia Basin Ecosystem Project

Size and location: The Columbia River basin east of the Cascade Crest (includes Idaho, western Montana, northern Nevada, and a corner of northwest Wyoming), plus the Upper Klamath basin in southeast Oregon and northern California.

Nature of EPA involvement: Full involvement; EPA staff assigned to the interagency Science Integration Team based at Walla Walla, WA.

Organization that initiated project:

U.S. Forest Service, at the direction of President Clinton.

Major environmental problems: Much of the federal public land within this region has been severely degraded by poor logging and grazing practices. However, the public lands are typically in better shape than nonfederal lands and thus contain the last refuges of many of the Pacific Northwest's endangered ecosystems. Unfortunately, even these remaining lands are seriously threatened by intense pressure to maintain high levels of grazing and timber production.

Actions taken or proposed: Interagency, interdisciplinary teams have been established to evaluate the current health of eastside ecosystems; to determine what we want these ecosystems to look like in the future and how they may be used; to identify alternative ways of achieving those future goals; and, finally, to evaluate the scientific, social, and economic effect of actions to achieve those goals. Ecosystems on both public and private lands will be evaluated. While the management strategies ultimately adopted will apply only to federal lands, the findings and recommendations will hopefully also guide the management of adjacent nonfederal lands.

Stakeholders:

Participating federal agencies:

- Bureau of Indian Affairs
- U.S. Forest Service
- Bureau of Land Management
- National Marine Fisheries Service
- Natural Resources Conservation Service
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers

County and local governments

Tribal governments

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Pacific Northwest Ecosystem Management Research Initiative

Size and location: Pacific Northwest is defined as Washington, Oregon, and Idaho. Project includes regional-scale analyses as well as work in two case study watershed/ecoregions: (1) Willamette River basin, in Oregon, approximately 29,400 square kilometers, and (2) southern portion of the Washington Coastal Ecoregion, which includes the Quinault, Chehalis, and Willapa watersheds and is about 10,500 square kilometers.

Nature of EPA involvement: Ecological research program designed to contribute to an "ecosystem approach" to environmental management. To complement other federal research programs in the region, EPA's research focuses on nonforested lands and watersheds/ecoregions with multiple land uses.

Organization that initiated project: EPA Office of Research and Development (ORD) Environmental Research Laboratory-Corvallis. Effort is part of the follow-up to the President's Northwest Forest Conference and Forest Ecosystem Management Plan. ORD is also working closely with EPA Region 10.

Major environmental problems:

- Threatened and endangered species, in particular several salmon stocks
- Declines in fisheries and forestry yields
- Declines in biodiversity and water quality
- Limits on water quantity

Actions taken or proposed: This is a research program and does not directly involve management actions or regulations. EPA does, however, intend to evaluate the potential ecological consequences of management alternatives proposed by others. EPA is working closely with other federal agencies to coordinate research in the region, through the Interagency Research and Monitoring Committee established after the President's Forest Conference.
Major projects included within the Pacific Northwest Ecosystem Management Research Program are as follows:

- Regional-scale assessment of biodiversity.
- Watershed-scale ecological assessments dealing with multiple valued endpoints and stressors in the two case study watershed/ecoregions.
- Research on riparian area functions, condition, and restoration.
- Effects of sedimentation and biological stressors on estuarine ecosystems.
- Integrated ecological monitoring design
- Ecological/socioeconomic linkages.
- Technology information transfer.

Stakeholders: EPA is working closely with state, tribal, and local governments in the two case study watershed/ecoregions, and with state governments for the regional-scale analyses of biodiversity. Much of the interaction with stakeholders is coordinated through EPA Region X.

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this year for approval.

Stakeholders:

Agricultural industry
Agricultural organizations
Conservation organizations
County and parish governments
Cultural heritage organizations
Environmental organizations
Federal, state, and local agencies
Flood control interests
Forest products industry
Grassroots groups
Hunting and fishing interests
Planning agencies
Public: farm and nonfarm, nongovernment organizations
Recreation industry
Small landowners
Tourism industry
Universities
Urban interests

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Prairie Pothole Region (PPR) Ecosystem Assessment

Size and location: Portion of PPR located within State of North Dakota, with lower level of effort in the portions of the PPR located in South Dakota and Minnesota.

Nature of EPA involvement: EPA's Wetlands Research Program (WRP) is conducting several studies within the PPR aimed at evaluating ecosystem function, assessing risk, and prioritizing restoration. Specific projects include pesticide exposure risk assessment, risk assessment relative to mallard production, determining the influence of landscape factors on wetland habitat, evaluating the ability to restored farmed pothole wetlands, and mapping priority areas for wetland restoration so as to provide maximum habitat benefit.

Organization that initiated project:

EPA's Wetlands Research Program
EPA Office of Research and Development - Environmental Monitoring and Assessment Program

Major environmental problems:

- Drainage
- Pesticide exposure
- Sedimentation
- Habitat loss
- Waterfowl population decline

Actions taken or proposed: Studies to support the risk assessments and to determine the influence of landscape factors on wetland habitat are underway. Both include development and testing of indicators. The work on restoration is being planned; we anticipate being in the field in the summer of 1996.

Stakeholders:

Conservation groups, such as Ducks Unlimited
EPA Region VIII
National Biological Survey
Natural Resources Conservation Service
State of North Dakota
U.S. Fish and Wildlife Service
Various state agencies

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Mid-Atlantic Integrated Assessment (MAIA)

Size and location: The proposed study area is the Mid-Atlantic region of the eastern United States and its watersheds, defined by the land and near coastal area that includes all of EPA Region III and parts of Regions II and IV. The region extends from southern New York into northeastern North Carolina. The region includes EPA Region III (i.e., Pennsylvania, West Virginia, Maryland, Delaware, and Virginia); the Susquehanna and Allegheny River basins, which extend into New York; the Delaware River basin, which extends into New Jersey; and the Chowan-Roanoke and Neuse-Pamlico basins, which extend into North Carolina. The Mid-Atlantic region encompasses the area from the Mid-Appalachian highlands to the estuaries.

Nature of EPA involvement: MAIA will be conducted as a partnership between EMAP and EPA Region III. This partnership will help EMAP focus its research toward developing technology for addressing assessment questions of importance to environmental and resource managers. Region III will provide EMAP with client-based feedback about the utility of assessment results. Region III's interest in MAIA and its continuing efforts in regional assessment will help EMAP access additional data sources in the region.

Organization that initiated project: As a partnership, MAIA has parallel functions of research and assessment. EMAP will use MAIA as a forum for research to improve the tools scientists use to monitor the environment. Region III will use MAIA's assessment results to guide environmental management. MAIA, therefore, will be both a process-driven (research) and product-driven (assessment) activity with the following two objectives:

(1) Conduct ecological research at different spatial scales in the mid-Atlantic region.

The research conducted for MAIA will be a pilot for investigating scale and integration assessment issues of interest to other regions. MAIA's ecological research will address fundamental issues pertaining to the sampling design and ecological indicators used to explain the condition of an ecosystem and its component resources. This research will produce improved, validated methods and more certain descriptions of important ecological processes, exposures, effects, and risks. These methods will be refined in the context of MAIA to ensure they provide the information necessary for managing ecological risks. Specifically, attempts to assess ecological condition at the scale of interest to resource managers (e.g., the watershed or ecoregion) will suggest possible enhancements of EMAP.

(2) Produce assessments of the mid-Atlantic region across ecological resources and at different spatial scales.

MAIA will produce a range of assessments, including those focusing on single resources, single resources and ancillary data, and multiple resources. The assessment will address different spatial scales ranging from the state of the region to individual watershed assessments (where adequate data are available). These assessments will allow scientist and managers to draw conclusions about the condition of the ecological resources in the mid-Atlantic region and to relate the findings to appropriate management issues. The findings will assist regional and state authorities with environmental planning and management, improve our understanding of ecosystem condition, and enhance our ability to design protective or remedial strategies at regional and state levels.

Actions taken or proposed: The overall approach to MAIA will be to conduct research in the context of design and analysis activities necessary to produce a State of the Region report. Not only will this lead to an assessment of great benefit to Region III, but it will also provide a conceptual framework for focusing EMAP research to ensure that it is relevant to EPA's needs. This synergistic approach will enable MAIA to overcome the gaps in data and methodology that limit integrated ecosystem assessment.

President's Forest Plan (Pacific Northwest)

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New England Resource Protection Project

Size and location: The States of New Hampshire, Connecticut, and Rhode Island. In the future, all of the New England states will be included.

Nature of EPA involvement: EPA initiated the project and is working with an interstate organization to administer its implementation. Resources have been provided in the form of funding and technical and programmatic staff support.

Organization that initiated project:
U.S. EPA - New England

Major environmental problems:
- Population growth
- Habitat loss and alteration
- Nonpoint sources of contamination
- Waterborne and airborne discharges and emissions
- Hazardous waste sites

Actions taken or proposed: The New England Resource Protection Project is an innovative effort to protect New England's most important natural resources, including habitat, water supply, agriculture, forestry, and outdoor recreational opportunities. The project began in the State of New Hampshire, where priority resource areas have been identified and protection measures developed. Work is starting with Connecticut and Rhode Island and eventually will expand to all of New England.

Specific measurable environmental goals will be developed once the priority resources are selected, but examples of goals that might be considered include reopening all of the shellfish beds in Great Bay; working with landowners to keep intact large tracts of unfragmented land; ensuring that effective programs are in place to protect the most important drinking water supplies; and ensuring that withdrawal from these supplies does not threaten wildlife habitat.

Following selection of priority resource areas, EPA will work with municipal, state, and federal governments, regional planning agencies, environmental and business organizations, and others to protect the resources.

Stakeholders:
Appalachian Mountain Club
Audubon Society of NH
Business and Industry Association of NH
New England Interstate Water Pollution Control Commission
NH Department of Environmental Services
NH Department of Resource and Economic Development
NH Department of Fish and Game
NH Department of Transportation
NH Department of Agriculture
NH Lakes Association
NH Office of State Planning
NH Rivers Council
NH Timberland Owners Association
Society for the Protection of NH Forests
The Nature Conservancy
UNH Cooperative Extension Program
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
USDA Natural Resources Conservation Service
Various regional planning agencies and watershed councils
Local governments

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Rio Grande/Rio Bravo Watershed Project

Size and location: The Rio Grande (called the Rio Bravo in Mexico) stretches 2500 kilometers (1551 miles) that border Texas and Mexico, and its watershed encompasses 366,500 square kilometers (141,506 square miles), 66 percent in Mexico and 34 percent in Texas.

Nature of EPA involvement:

- Development of binational watershed planning framework
- Support of state, U.S., and Mexican monitoring programs

Organizations that initiated project:

U.S. EPA
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
International Boundary and Water Commission

Major environmental problems:

- High levels of fecal contamination in river downstream of major Texas/ Mexican cities
- Elevated levels of chlorine in the river
- Limited information on toxic substance impacts on the aquatic environment

Actions taken or proposed:

- Construction of wastewater treatment plant in Nuevo Laredo, Mexico
- Binational toxics study completed September 1994
- Developing "Watershed Alliance" task force to coordinate stakeholder involvement within the Rio Grande/Rio Bravo watershed.

Stakeholders:

National, state, and local agencies responsible for water quality along the Texas/Mexico border
Residents of the Texas/Mexico border

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Prairie Potholes/Missouri Coteau Ecoregion Assessment

Size and location: Missouri Coteau Ecoregion of North Dakota 4,000,000 hectares (9,879,000 acres) (22 percent of the State of North Dakota).

Nature of EPA involvement: The Wetland Function Project at ERL-Duluth is coordinating the application of two ecological risk assessment strategies to analyze the effects of agricultural stressors and best management practices (BMPs) on prairie pothole ecosystems. Research efforts are being supported through a combination of in-house staff, contract staff, and interagency agreements with the National Biological Survey (NBS), the U.S. Geological Survey (USGS) and the Army Corps of Engineers (ACOE).

Organization that initiated project:

U.S. EPA Wetland Research Program
ERL-Duluth in collaboration with ERL-Corvallis

Major environmental problems: Major environmental problems in the Prairie Pothole Region include wetland habitat loss and degradation, leading to declines in regional waterfowl production. Agricultural stressors leading to wetland habitat degradation include wetland drainage, wetland tillage, sedimentation, turbidity, and pesticides.

Actions taken or proposed: A series of ecosystem-level experiments are being conducted to assess the effects of agricultural stressors on the ecological health of prairie pothole wetlands, as well as the effectiveness of best management practices (BMPs) in protecting these ecosystems. Data from the field experiments are being used to update, calibrate, and validate ecological response models (vegetation succession, wetland bioenergetics (food chain), and habitat-based waterfowl population models). Stressor and response models will be applied to a random sample of prairie potholes across the Missouri Coteau Ecoregion of North Dakota (Environmental Monitoring and Assessment sites) to predict the effects of historical, present, and future management scenarios on regional waterfowl production. In addition, the relative risk of pesticides to wetland biota in North Dakota as a whole is being assessed on a county-by-county basis. Relative risk indices are being calculated based upon pesticide loading rates, acute and chronic toxicity, bioaccumulation, and biodegradation potential.

These two assessment strategies will provide tools not only for analyzing existing problems, but also for examining reductions in ecological risk associated with alternative future management scenarios.

Stakeholders:

The U.S. EPA, ERL-Duluth has been collaborating with NBS, USGS, and U.S. ACOE during the experimental and assessment phases of these projects. Assessment tools and results will be communicated to appropriate management agencies (e.g., U.S. Fish and Wildlife, Natural Resources Conservation Service, and Agricultural Extension Service) to ensure that implications of agricultural and wetland management activities are taken into account.

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The North Bay includes part of Marin, Solano, Sonoma, and Napa Counties and is known for vast ranch lands, rich aquatic habitats, and some of the most productive vineyards in the world. EPA Region IX is coordinating the North Bay Initiative, the purpose of which is to develop and implement a resource management plan for North Bay watersheds that will improve coordination among various efforts and is consistent with the San Francisco Bay/Delta CCMP. Fourteen local, state, and federal agencies have signed a Memorandum of Agreement to work cooperatively with landowners and local governments to develop the plan, which will address environmental restoration, incentives for continuing agriculture, and partnerships for determining sensible land uses.

On December 15, 1994, four federal agencies (EPA, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and U.S. Bureau of Reclamation) announced a comprehensive package of actions under the Clean Water Act, Endangered Species Act (ESA), and Central Valley Project Improvement Act to protect the fish and wildlife resources of the Bay/Delta estuary. Previously, the four federal agencies and the State of California signed an agreement to establish a comprehensive program for the management of the Bay/Delta estuary. Under the agreement, the state and federal agencies will work toward adoption of mutually acceptable water quality standards, coordinated implementation of ESA requirements and water project operations, and development of a long-term planning process for water management in California. The consensus-based effort, now known as the Bay/Delta Ecosystem Partnership, will be led by an interagency staff drawn from the participating state and federal agencies and an advisory council representing the State's urban, agricultural, and environmental interests.

The Central Valley Agriculture and Wetlands Initiative is focused on localized outreach and planning to address agricultural and wetlands issues in the San Joaquin and Sacramento River Watersheds. Through integration with the other Bay/Delta estuary activities, the Region has a significant opportunity to promote and expand these initiatives with other state and federal agencies and stakeholders in the Central Valley. This approach will help achieve the goal of expanding the focus of the long-term planning process beyond the impacts of water development to address pollutants, wetlands preservation, habitat loss, and other factors that affect the ecological health of the watershed. Specific projects are focusing on pesticides use reduction through whole farming system/integrated pest management demonstration, selenium reduction through better irrigation management and total maximum daily load (TMDL) implementation, and protection and management of vernal pool resources through local planning and outreach.

The Long-Term Management Strategy (LTMS) is designed to provide a comprehensive regional plan for the placement of dredged material for San Francisco Bay for the next 50 years. Formed in January 1990, and led by a four-agency, federal/state partnership, the LTMS involves over 30 participants representing government agencies, environmental organizations, ports, and fishermen's groups. The overall goal of LTMS is to publish a Management Plan in 1996 that guides the dredging, disposal, and beneficial re-use of dredged material in the region.

Stakeholders:

- Bay Conservation and Development Commission
- Business
- California Department of Parks and Recreation
- Central Valley Habitat Joint Venture
- Central Valley Regional Water Quality Control Board
- Delta Protection Commission
- Elected officials
- Environmental groups
- Industry
- National Marine Fisheries Service
- Nine counties in the Bay Area and three counties in the Delta
- Resource Conservation Districts
- State Water Resources Control Board and Regional Boards #2 and #5
- The Nature Conservancy
- U.S. Army Corps of Engineers

President's Forest Plan (Pacific Northwest)

Size and location: The President's Forest Plan covers western Washington and Oregon and northern California.

Nature of EPA involvement: Advocate for compliance with the Clean Water Act through Watershed analysis, restoration project identification, monitoring, ecosystem management research, geographic information system development, and coordination with non-federal land managers. Toward these goals, EPA has provided approximately $3 million for research and $2 million for restoration activities.

Organization that initiated project:

U.S. Government (President Clinton)

Major environmental problems:

- Court-ordered injunctions on federal (U.S. Forest Service/U.S. Bureau of Land Management) timber sales/harvest in western Washington, Oregon, northern California
- Endangered Species Act (ESA) issues - northern spotted owl, marbled murrelet—"old growth" forest ecosystem provides critical habitat
- Pending petitions for ESA listing of other species impacted by forest harvest (e.g., salmon, steelhead, bull trout)
- Regional economic impacts—significant reduction in forest-related jobs, particularly for rural communities whose economic base depends on forest industry

Actions taken or proposed: A Final Environmental Impact Statement Record of Decision (FEIS ROD) and accompanying standards and guidelines, filed in federal court on April 14, 1994, provides for coordinated land management for lands administered by the U.S. Forest Service and Bureau of Land Management (BLM) within the range of the northern spotted owl.

This region-wide management direction will provide overall coordination across administrative units, provinces, and watersheds in Forest Service and BLM lands, for the areas and resources covered by the recent final Supplemental Environmental Impact Assessment (SEIS) issued in February 1994.

This new management direction will apply to projects that will be conducted after site-specific environmental analysis. The coordinated management direction established by the ROD will also be incorporated into all land and resource plans within the range of the northern spotted owl as they are completed or revised.

For the Forest Service and BLM, this decision amends current land and resource management plans with additional land allocations and standards and guidelines.

The President's Plan is divided into two main sections: aquatic and terrestrial. The aquatic conservation strategy is aimed at restoring and maintaining the ecological health of watersheds. The strategy is designed to provide a scientific basis for protecting aquatic ecosystems and to enable planning for sustainable resource management. The goals of the terrestrial section of the plan are (1) to maintain late-successional and old growth species habitat and ecosystems on federal land and (2) to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations.

Stakeholders:

Conservation groups
Federal, state, and local agencies
Industrial and nonindustrial landowners
Interagency Steering Committee (ISC), composed of U.S. Department of the Interior, U.S. Department of Agriculture, U.S. EPA, and National Oceanic and Atmospheric Administration
Regional Interagency Executive Committee (RIEC), composed of Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Bureau of Indian Affairs, U.S. EPA, Natural Resources Conservation Service, the States of Washington, Oregon, and California, and three tribal organizations
The public

South Florida Geographic Initiative

Size and location: The South Florida Geographic Initiative encompasses watersheds in the southern terminus of the Florida peninsula. This region includes the Kissimmee River, Lake Okeechobee, the Everglades, Big Cypress, Florida Bay, and the Florida Keys; it contains 3 National Parks, one National Preserve, 2 National Marine Sanctuaries, and 12 National Wildlife Refuges. The watershed is also home to over 6 million people.

This initiative is linked with a number of smaller place-based projects, including the Florida Keys Wetlands Advance Identification Project, the Florida Everglades Mercury Ecological Assessment, and the Florida Keys National Marine Sanctuary. All of the related smaller projects are listed in Part Two: Regional Summaries, in the Region IV Chapter.

Nature of EPA involvement: EPA is active in the South Florida Ecosystem in a variety of ways:

- Conducting an investigation of mercury contamination in the watershed.
- Developing a Water Quality Protection Program for the Florida Keys National Marine Sanctuary (FKNMS).
- Participating as a member in the Federal Interagency Task Force, which addresses environmental problems in South Florida.
- Providing funding (more than $2 million in FY93-94) to the state and research agencies.
- Developing a comprehensive South Florida Wetlands Permitting and Mitigation Strategy.

Organizations that initiated project:

U.S. Environmental Protection Agency
U.S. Department of the Interior
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Commerce
State of Florida

Major environmental problems:

- Mercury contamination of Everglades fish and other biota
- Ecological degradation of Florida Bay and the FKNMS
- Water supply conflicts among agricultural interests, natural resources, and an expanding urban population
- Nutrient enrichment of the Everglades by agricultural or urban drainage water
- Loss of historic hydropatterns, water gradients, and discharge
- Rapid regional population growth
- Spread of exotic plants and animals
- Loss of native populations and species of flora and fauna
- Extensive conversion of remaining wetlands and natural lands to other land uses.

Actions taken or proposed: In 1993, a 5-year interagency agreement on South Florida Ecosystem restoration was signed by six federal departments including EPA, creating a task force to further ecosystem restoration, protection, and maintenance. The watershed was chosen as an appropriate unit for ecosystem management. Efforts are to be comprehensive in nature, with various agencies taking the lead on specific restoration activities. A focus of the interagency effort is the submission of an integrated plan for ecosystem restoration, maintenance, and protection that details current achievements, ongoing activities, and projected accomplishments. This plan, which is to be updated annually, is to include an evaluation of the effectiveness of ongoing efforts.

A multitude of specific efforts are under way to address environmental problems in the South Florida watershed. EPA has designed and begun to carry out a comprehensive interagency multidisciplinary study to address the mercury contamination issue and identify sources and solutions. EPA is working with National Oceanic and Atmospheric Administration and the State of Florida to develop and implement a water quality protection program for the Florida Keys National Marine Sanctuary. The Army Corps is proceeding with a number of projects that will attempt to provide the hydrologic capability to restore the hydrology and ecology of portions of Everglades National Park, the Kissimmee River,

Rio Grande Basin Landscape-Scale Assessment

Size and location: Site incorporates the southern New Mexico, Arizona, and west Texas areas and includes the Jornada Long-Term Ecological Research Site.

Nature of EPA involvement: Joint research between Environmental Monitoring Systems Laboratory-Las Vegas (EMSL-LV) and the U.S. Department of Agriculture's Agriculture Research Service (USDA ARS) to develop a landscape-scale assessment of vegetation community status and change. EMSL-LV is funding this project through an interagency agreement with ARS at New Mexico State University. ARS is matching the funding.

Organization that initiated the project:
U.S. EPA EMAP

Major environmental problems: Degradation and alteration of critical ecological components and processes due to the magnitude and distribution of land uses has occurred over the southwestern United States. These alterations have affected several important ecological resources, including streams, wetlands, and rangelands. Landscape-scale processes that have been altered include fire, water flow and discharge, and extinction/colonization. These alterations have resulted in declines in water quality, certain components of biological diversity, and rangeland productivity and have increased the risk of catastrophic flooding. Large-scale alterations have impacted the river system. However, the extent and distribution of these forms of alterations across the southwestern United States are currently unknown. Further, no information is available on the relative degrees of risk and scales of impairment.

Actions taken or proposed: EMAP-Landscapes has initiated development of large-scale landscape indicators. Specifically, EMAP-Landscapes and ARS are developing an AVHRR-based indicator of status and changes in vegetation composition, principally through the differential spectral signatures of different plants exhibited within and among years. The AVHRR satellite is a relatively inexpensive source of data that provides coverages over large areas twice daily. If successful, this approach could be used to assess status and changes in the pattern of vegetation communities over large areas and help prioritize areas needing improvement. Further, these data could be used to identify areas under greatest risk of decline.

Stakeholders:
U.S. EPA EMAP
U.S. EPA Region VIII
U.S. EPA Office of Water
New Mexico State University
USDA ARS
Rio Grande River Consortium
Desert Research Institute
Individual states
The general public
Other federal agencies, including U.S. Geological Survey, National Biological Survey, and Natural Resources Conservation Service

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Southern Appalachians Assessment (SAA)

Size and location: Southern Appalachians, which includes parts of Georgia, Tennessee, North Carolina, South Carolina, Alabama, and Virginia.

Nature of EPA involvement: EPA is co-leading, with the U.S. Forest Service (USFS), an ecological assessment of the region.

Other agencies involved include:

National Park Service
Fish and Wildlife Service
Natural Resource Conservation Service
National Biological Survey
Army Corps of Engineers
Oak Ridge National Laboratories (DOE)
Economic Development Administration
U.S. Geological Survey
Appalachian Regional Commission
The States of Georgia, North Carolina and Tennessee

Organizations that initiated project:

U.S. EPA
U.S. Forest Service

Major environmental problems: The Southern Appalachians are at risk for environmental degradation because of their unique setting, including the immense biological wealth, pleasant climate, and unique cultural resources. Some of the major environmental stressors or issues identified for the area include:

- Population growth, urbanization, and second-home recreational developments
- Acid and air toxic deposition
- Mine runoff and leaching to surface waters
- Erosion and siltation from mining, logging and recreational developments
- Nonpoint source pollution runoff from agriculture and other development activities
- The introductions of exotics

Habitat has been diminished, as has the quality of air, water, and land. The consequences of these stresses include diminished forest health and a reduction in species diversity and productivity. Consequences of special note include the disturbance to high-elevation bogs and the loss of endemic species and species of special concern, such as a number of freshwater mussels. The rich Southern Appalachian culture and existing socioeconomic structure, which have developed under an economy largely dependent on the region's natural resources, is also at risk due to environmental stresses placed on the region.

Actions taken or proposed: EPA and participating agencies are collecting data on the region to determine what problems exist and to develop a geographic information system program that is user-friendly for the public. The data will be grouped into five areas: terrestrial, aquatic, air, cultural, and landscape.

To save time and avoid redundancy, the project directors of the Southern Appalachian Assessment and the Southern Appalachian Man and the Biosphere Reserve Area (SAMAB) Landscape-Scale Assessment project have agreed to follow EPA's Environmental Monitoring and Assessment Program (EMAP) protocol, which will allow the more in-depth SAMAB Landscape-Scale Assessment project to utilize the results of the Southern Appalachian Assessment. The description following on the next page describes in detail the landscape assessment portion of the interagency project.

Stakeholders: In addition to Region IV and the states mentioned above, other stakeholders include: EPA Region III; EPA Office of Air Quality Planning and Standards; U.S. Forest Service; representatives from industry, special interest groups, and academia.

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San Francisco Bay/Sacramento-San Joaquin Delta Estuary

Size and location: The San Francisco Bay/Sacramento-San Joaquin Delta estuary covers the 4100-square-kilometer (1600-square-mile) watershed of the Bay and Delta and 107,000 square kilometers (41,300 square miles) of the Sacramento and San Joaquin River valleys in the Central Valley.

Nature of EPA involvement: The San Francisco Bay/Delta estuary has been a priority watershed for Region IX for a number of years. Funding has been contributed through sections 319 nonpoint source, 104(b)(3) wetlands, and 604(b) planning grants, San Francisco Estuary Project (SFEP), Geographic Initiative, and other base funding. A large amount of staff and managerial time has been committed to projects in this watershed including technical assistance, participation in multiple workgroups, management leadership, and facilitation and organizational assistance.

Organizations that initiated project:

U.S. Environmental Protection Agency
State of California
Other federal agencies
Multiple local agencies

Major environmental problems:

- Destruction or fragmentation of wetlands and riparian forest resulting from agricultural conversion and urban expansion
- Diversion of fresh water and loss of low-salinity habitat
- Alteration of aquatic habitats related to water supply systems including dams, reservoirs, pumping facilities, and canals
- Discharge of pollutants such as pesticides, fertilizers, oil and grease, metals, nutrients, and sediments from farms, ranches, and cities

Actions taken or proposed: The San Francisco Bay/Sacramento-San Joaquin Delta estuary is the largest estuary on the west coast of the Americas and drains over 40 percent of the water in California. The estuary supports more than 120 species of fish and is a waterfowl migration and wintering area of international importance. As a result of water diversion and other human-induced impacts, the estuary's ability to support a diverse ecosystem has declined. While the problems in the estuary are great, they are matched by opportunities of equal magnitude. EPA and other state, federal, and local agencies have been developing an integrated ecosystem-based approach to restoring the ecological health of the estuary. EPA has contributed to these efforts through the National Estuary Program, Water Quality Standards and Ecosystem Partnership, a Regional Wetlands and Agricultural Initiative, Nonpoint Source Grants, and the Long-Term Management Strategy for Dredged Material Disposal.

In 1987, Congress established the SFEP under the National Estuary Program. In 1993, SFEP participants completed a 5-year planning process with a blueprint for the restoration of the estuary—the Comprehensive Conservation and Management Plan (CCMP). Responsibility for implementation of the CCMP is being overseen by a broad-based committee, with primary leadership from the state's San Francisco Bay Regional Water Quality Control Board.

In 1992, the SFEP established a network of demonstration projects for watershed protection designed to link environmental protection with economic prosperity. These projects bring together scientists, regulators, farmers, and citizen activities to develop strategies for accommodating human activities while improving resource protection. Projects include mapping the distribution of native fish and streamside forests, innovative livestock management, sustainable agriculture, farmland preservation, wetland restoration, and citizen monitoring. Furthermore, the San Francisco Estuarine Institute has been formed to implement the Regional Monitoring Strategy to better characterize ecosystem processes and to measure the performance of CCMP. As the project moves into its implementation phase, geographic subcommittees have been formed to tailor CCMP actions to address priority problems in the North Bay, South Bay, and Delta.

Southern Appalachian Man and the Biosphere Reserve Area (SAMAB) Landscape-Scale Assessment

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Upper Midwest Initiative, Interagency Cooperation on Ecosystem Management (ICEM)

Size and location The collection of states differs due to how the participating agencies delineate boundaries. Agencies cooperate in a given location when there is a specific problem to be addressed. (States generally included are Minnesota, Wyoming, Michigan, Illinois, Missouri, Indiana, and Ohio.)

Nature of EPA involvement: EPA provides support staff to coordinate interagency technical workgroups formed by 22 participating agencies (research, education, mapping, information systems, landscape design, and monitoring and assessment). Region V arranged a listserv function through Research Triangle Park to support communications for all workgroups.

Organization that initiated project: Midwest Federal Environmental Roundtable (an annual meeting of regional federal and state agencies)

Major environmental problems:

- Loss of biodiversity
- Protection of savanna and grassland ecosystems
- Classification and mapping systems that identify potential for restoration and protection
- Coordination on interjurisdictional issues
- Budgeting for activity in mutual areas of concern

Actions taken or proposed: Listserv established, attempting to create one for senior managers of signatory agencies; beginning to create a process for more senior management involvement; research workgroup provided to Great Lakes National Program Office (GLNPO) a ranking of research needs for oak savanna recovery; proposed to inventory and create a data base for regional terrestrial ecosystems research beginning with savanna types and use the same system that the University of Chicago has for aquatic research, allowing the systems to be integrated; initiated two upcoming training sessions, one on conflict resolution and the other on biodiversity conservation; provided a preliminary inventory of multiownership landscape management projects in the region; facilitated the acceptance and use of the U.S. Forest Service (USFS) National Hierarchy of Ecological Units and related mapping effort (to subsection level) for the region.

Stakeholders:

Formal signatories:

- Argonne Lab (Department of Energy)
- Bureau of Land Management (2 parts)
- Department of the Interior
- Indiana Department of Natural Resources
- Michigan Department of Natural Resources
- Minnesota Department of Natural Resources
- Missouri Department of Conservation
- National Oceanic and Atmospheric Administration
- National Park Service
- Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- U.S. EPA
- U.S. Forest Service (3 parts)
- U.S. Geological Service
- Wisconsin Department of Natural Resources

Workgroups include members from universities and nongovernmental organizations

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and the ecosystem as a whole. The State of Florida and the federal government are working with private interests to rectify the phosphorus enrichment issue that the Everglades faces. A South Florida wetlands conservation plan will be developed through the Wetlands Permitting and Mitigation Strategy to address problems associated with historic wetland losses and rapid population growth.

Stakeholders:

Local governments
National and local environmental groups
South Florida agricultural interests
South Florida urban interests
State of Florida
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of the Interior
U.S. Environmental Protection Agency

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Part Two:
Regional Summaries of Local-Scale Ecosystem Protection Efforts

Southern Appalachian Man and the Biosphere Reserve Area (SAMAB) Landscape-Scale Assessment

Size and location: Site incorporates what is know as the SAMAB area, which includes the six-state area of Tennessee, southwest Virginia, northern Georgia, northern Alabama, western South Carolina, and western North Carolina. The project area is considered regional.

Nature of EPA involvement: Conduct research on landscape indicators and conduct assessments of status and trends of landscapes and medium-sized watersheds and relate findings to conditions in a wide number of aquatic and terrestrial resources. The majority of this work will be conducted and cost-shared by the Tennessee Valley Authority. Results from the Mid-Atlantic Landscape project will be applied to this project. Similar to the Mid-Atlantic project, results generated from assessments will be useful in generating alternatives for ecosystem management and in conducting ecological risk assessments.

Organization that initiated the project:
U.S. EPA EMAP

Major environmental problems: Degradation and alteration of critical ecological components and processes due to the magnitude and distribution of land uses have occurred over the SAMAB Region. These alterations have affected several important ecological resources within the SAMAB Region, including streams, wetlands, forests, estuaries, and breeding birds and other attributes of biological diversity. Landscape-scale processes that have been altered include fire, water flow and discharge, and extinction/colonization. These alterations have resulted in declines in water quality and certain components of biological diversity and have increased the risk of pest outbreak and catastrophic flooding. However, the extent and distribution of these forms of alternations across the SAMAB region are currently unknown. Further, no information is available on the relative degrees of risk and scales of impairment.

Actions taken or proposed: EMAP-Landscapes is proposing two primary activities:

- Landscape indicator development that can be applied to multiple-scale ecological assessments

- An assessment of status and trends in landscapes as related to:
  - biological diversity and integrity
  - watershed integrity (water quality, quantity, and timing)
  - landscape resilience (the ability of a landscape or watershed to maintain options for ecological goods and services in the face of combinations of anthropogenic and natural disturbance).

EMAP-Landscapes will assess status and trends in landscapes and watersheds over the entire region. This activity will be conducted in conjunction with EPA Region IV's regional ecological risk assessment. Part of this assessment will include relating individual ecological resources, including forest, streams, estuaries, and a variety of wildlife habitats, with landscape pattern at multiple scales. The outcome of this assessment should be a fundamental understanding of the scales at which landscape change influence different ecological resources. It is EMAP-Landscapes' hypothesis that different resources will have different scaling relationships with landscapes. This information will be key in understanding the range of risks influencing ecological resources, and in deriving approaches to improve existing conditions. Completion of this project depends on availability of land cover data.

Stakeholders:
General public
Individual States
National Biological Survey
Natural Resources Conservation Service
Oak Ridge National Laboratory
SAMAB partners
Tennessee Valley Authority
U.S. EPA Region IV
U.S. EPA Office of Water
U.S. EPA EMAP
U.S. Geological Survey

Part Two:
Regional Summaries of Local-Scale Ecosystem Protection Efforts

Whereas EPA's large-scale projects are more widely known, its local-scale projects are more abundant and considerably more diverse. The places where these projects occur range from a few hectares to thousands of square kilometers in area. Many of the projects focus on watersheds of various scales as the natural unit of interest. Other projects are based on areas bounded by other types of ecological boundaries, and a few are based on jurisdictional boundaries. The activities within these projects might include ecological assessment, research, monitoring, economic valuation, planning, or environmental management.

These local-scale projects might or might not have the ecological complexity of the larger regional initiatives. There are, however, usually fewer stakeholders concerned with the area. This could indicate that it is easier to involve all major interests in the place-based approach on the local scale.

The following 10 chapters include summaries of all 10 Regions' local-scale projects, and a Regional projects map accompanies each chapter. Projects that extend across Regional boundaries are repeated under each Region in which they occur.

The local-scale projects in the Inventory at this time, sorted by EPA Region, include:

New England Region Projects:
- Blackstone River, MA
- Buzzards Bay, MA
- Casco Bay Estuary Project, ME
- Green Spaces Healthy Places Project, MA
- Lake Champlain, NY, VT
- Lake Champlain Advance Planning Area, VT
- Long Island Sound, NY, CT
- Massachusetts Bays Program, MA, NH
- Massachusetts Bays Program/ Mini-Bays Project, MA
- Merrimack River, NH, MA
- Narragansett Bay, MA, RI
- New Bedford Harbor Watershed Assessment Project, MA
- Portsmouth Naval Shipyard Ecological Risk Assessment, NH, ME
- Waquoit Bay, MA

Region II Projects:
- Alcyon Lake, NJ
- Barnegat Bay, NJ
- Buffalo River Area of Concern, NY
- Cranberry Lake, NJ
- Deal Lake, NJ
- Delaware Estuary, DE, NJ
- Eighteenmile Creek Area of Concern, NY
- Greenwood Lake, NJ, NY
- Hackensack Meadowlands District, NJ
- Lake Champlain, NY, VT
- Lake La Plata, PR
- Lake Loiza, PR
- Lake Musconetcong, NJ
- Lake Ontario Toxics Management Plan, NY, Ontario
- Long Island Sound, CT, NY
- New York City Water Supply Watersheds, NY
- New York-New Jersey Harbor, NJ, NY
- Niagara River Area of Concern, NY
- Niagara River Toxics Management Plan, NY

Southern Appalachian Mountains Initiative (SAMI)

Size and location: The area of concern is the Southern Appalachian Mountains within the boundaries of Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

Nature of EPA involvement: SAMI is a multi-organizational alliance of state and federal government agencies, industries, academia, environmental organizations, and other stakeholders across the region. As a member of this partnership, EPA Region IV provides direction and technical assistance to the Initiative through its involvement on the SAMI Governing Body, committees, and subcommittees. In addition to in-kind services, EPA has also contributed $225,000 annually since FY93 from EPA's 105 Air Grants Program.

Organization that initiated project: The Federal Land Managers for Shenandoah National Park, Great Smoky Mountains National Park, and James River Face Wilderness Area made adverse impact determinations in reviews of proposed Prevention of Significant Deterioration (PSD) air permits for major new sources of air pollution. It was these adverse impact findings on PSD permits that spurred the voluntary creation of SAMI.

Major environmental problems:

- Research and monitoring in national parks and wilderness areas of the Southern Appalachian Mountains have documented adverse air pollution effects on visibility, streams, soils, and vegetation.
- Air pollutants such as sulfur and nitrogen oxides, ozone, and volatile organic compounds, adversely affecting park and wilderness resources, come largely from existing mobile and stationary sources both near and distant.
- The precise amount that each source contributes to the regional air pollution problem is not clear.

Actions taken or proposed: Through a cooperative effort, SAMI will identify and recommend reasonable measures to remedy existing and prevent future adverse effects from human-induced air pollution on the air-quality-related values of the Southern Appalachians, weighing the environmental and socioeconomic implications of any recommendations. This goal will be realized through the development of an integrated assessment framework, which will be used to evaluate the impact of the Clean Air Act Amendments as well as other emission management options.

Stakeholders: In addition to Region IV and the states mentioned above, other stakeholders include:

EPA Region III
National Park Service
Office of Air Quality Planning and Standards
U.S. Forest Service
Representatives from industry, special interest groups, and academia

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Region IV Projects (cont):
- West Chatham County Wetlands Advance Identification (ADID) Project, GA
- West Kentucky Coalfield Wetlands Advance Identification (ADID) Project, KY

Region V Projects:
- Ashtabula River Area of Concern, OH
- Big Darby Creek, OH
- Cache River, IL
- Clinton River Area of Concern, MI
- Lake Michigan, IL, IN, MI, WI
- Lake Superior EMAP-Great Lakes Assessment, MI, MN, WI
- Lower Mississippi Alluvial Valley Wetland Conservation Plan, MS, LA, AR, TN, KY, MO, IL
- Maumee River Area of Concern, OH
- Milwaukee Estuary Area of Concern, WI
- Mississippi River Gateway Project, IL, MO
- Northwest Indiana Environmental Initiative, IN
- Saginaw Bay, MI
- Saginaw Bay Urban Targeting Project, MI
- St. Mary's River, MI
- Southeast Chicago Urban Environmental Initiative, IL
- Southeast Michigan Initiative, MI
- Tri-State Initiative, KY, OH, WV

Region VI Projects:
- Arbuckle-Simpson Aquifer Project, OK
- Barataria-Terrebonne Estuary, LA
- Corpus Christi Bay, TX
- Galveston Bay Estuary, TX
- Illinois River - Battle Branch, OK
- Jornada Long-Term Ecosystem Research Project, NM
- Lake Pontchartrain Basin, LA
- Lake Worth, TX
- Lower Mississippi Alluvial Valley Wetland Conservation Plan, MS, LA, AR, TN, KY, MO, IL
- Tangipahoa River, LA
- Tensas River Basin Initiative, LA

Region VII Projects:
- Beeds Lake, IA
- Big Spring Basin, IA
- Centerville Reservoirs Project, IA
- Cheyenne Bottoms Wetland Project, KS
- Clear Lake, IA
- Eastern Nebraska Saline Wetlands, NE
- Elm Creek, NE
- Hillsdale Reservoir, KS
- Iowa Great Lakes, IA
- Lower Mississippi Alluvial Valley Wetland Conservation Plan, IL, LA, MS, AR, KY, TN, MO
- Meramec River, MO
- Mississippi River Gateway Project, IL, MO
- Omaha Stretch of the Missouri River, IA, NE
- Papio Lakes Project, NE
- Pine Creek, IA
- Platte River, NE
- Salt Valley Lakes Project, NE
- Storm Lake Project, IA
- Upper Big Mill Creek, IA
- Upper Niangua River Watershed, MO
- Walnut Creek Prairie Restoration Project, IA
- Walnut Creek Watershed Project, IA

Region VIII Projects:
- Animas River Basin Watershed Project, CO
- Bear River, ID, UT, WY
- Blackfoot River, MT
- Bowman-Haley Reservoir, ND
- Chalk Creek, UT
- Clark Fork-Pend Oreille Watershed, ID, MT, WA
- Clear Creek, CO
- Goodman Creek, ND

New England Region Projects

Example projects submitted by the New England Region include the 14 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on watersheds, but these range from inland lakes and rivers to coastal watersheds, estuaries, and sounds. Nutrient enrichment, habitat degradation, ocean pollution, human and environmental health hazards, and chemical and pathogenic contaminants are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the New England Resource Protection Project, the Gulf of Maine Initiative, and the Environmental Monitoring and Assessment Program (EMAP) Northeastern Lake Assessment.

New England Region projects in the Inventory at this time include:

Blackstone River, MA
Buzzards Bay, MA
Casco Bay Estuary Project, ME
Green Spaces Healthy Places Project, MA
Lake Champlain, NY, VT*
Lake Champlain Advance Planning Area, VT
Long Island Sound, NY, CT*
Massachusetts Bays Program, MA, NH
Massachusetts Bays Program/Mini-Bays Project, MA
Merrimack River, NH, MA
Narragansett Bay, MA, RI
New Bedford Harbor Watershed Assessment Project, MA
Portsmouth Naval Shipyard Ecological Risk Assessment, NH, ME
Waquoit Bay, MA

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Region II Projects (cont):
- Onondaga Lake, NY
- Oswego River Harbor Area of Concern, NY
- Peconic Bay, NY
- Rochester Embayment Area of Concern, NY
- St. Lawrence River Area of Concern, NY
- San Juan Bay, PR
- Swartswood Lake, NJ

Region III Projects:
- Anacostia River, DC, MD
- Canaan Valley, WV
- Christina River, DE, PA
- Clinch Valley Watershed, VA
- Delaware Estuary, NJ, DE
- Delaware Inland Bays, DE
- Maryland's Atlantic Coastal Bays, MD
- Middle Fork River, WV
- National Capital Area (NCA) Municipal Solid Waste Initiative, DC, MD, VA
- Patuxent River Watershed, MD
- Pequea and Mill Creeks, PA
- Philadelphia Municipal Solid Waste Initiative, PA
- Pocono Habitat Demonstration Project, PA
- Prince William County Ecosystem Project, VA
- Silver Lake, DE
- Tri-State Initiative, KY, OH, WV
- Upper Tennessee River Basin, VA
- Virginia Eastern Shore Coastal Waters, VA

Region IV Projects:
- ACF/ACT Comprehensive Study, AL, FL, GA
- Albemarle-Pamlico Sound, NC
- Back Bay of Biloxi Ecosystem Assessment, MS
- Bayou Chico Ecological Assessment, FL
- Bayou Grande Ecological Assessment, FL
- Bayou Texar Ecological Assessment, FL
- Cahaba River Basin Project, AL
- Carteret County Wetlands Advance Identification (ADID) Project, NC
- Central Dougherty Plain Wetlands Advance Identification (ADID) Project, GA
- Charleston Harbor Project, SC
- Escambia River Watershed Project, FL
- Flint Creek, AL
- Florida Bay Algal Bloom Monitoring Project, FL
- Florida Everglades Mercury Ecological Risk Assessment, FL
- Florida Keys National Marine Sanctuary, FL
- Florida Keys Wetlands Advance Identification (ADID) Project, FL
- Huntsville Wetlands Advance Identification (ADID) Project, AL
- Indian River Lagoon, FL
- Land-of-Sky Municipal Solid Waste Initiative, NC
- Lower Mississippi Alluvial Valley Wetland Conservation Plan, IL, LA, MS, AR, KY, TN, MO
- Loxahatchee River Basin Wetland Planning Project, FL
- Mobile Bay Restoration Demonstrations, AL
- Pearl River Wetlands Advance Identification (ADID) Project, MS
- Pensacola Bay Watershed Evaluation, FL
- Rookery Bay Wetlands Advance Identification (ADID) Project, FL
- Sarasota Bay, FL
- Savannah River Basin, FL, GA, SC
- South Florida Wetlands Permitting and Mitigation Strategy, FL
- Tampa Bay, FL
- Tri-State Initiative, KY, OH, WV
- Weeks Bay Estuarine Research Project, AL
- West Broward County Wetlands Advance Identification (ADID) Project, FL

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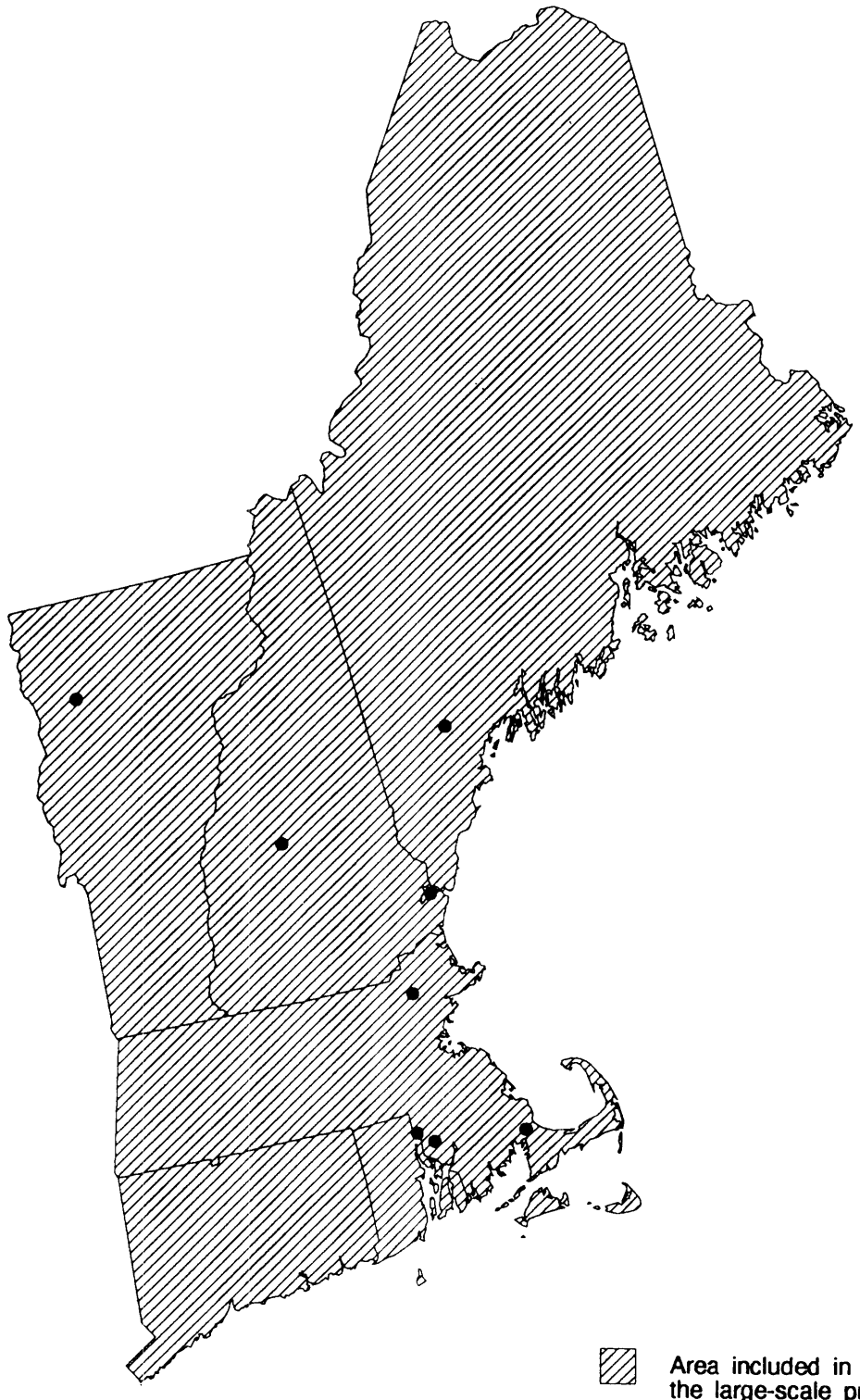
Figure 2:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 1 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale project

State Boundary

Scale 1:4,000,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-1/10
Area boundaries and reference point locations are approximate.

Columbia
Lake Roosevelt, WA
Middle Snake River, ID
Pacific Northwestern Watershed
Economic Valuation Project, WA
Puget Sound Estuary, WA
Tillamook Bay, OR
Willamette River Basin, OR
Willapa Bay Watershed Project,
WA
Yakima River, WA

Casco Bay Estuary Project

Size and location: Casco Bay covers 593 square kilometers (229 square miles) and its watershed covers 2251 square kilometers (985 square miles). The bay extends from Cape Elizabeth, Maine, to Phippsburg, Maine. Portland, Maine's largest city, borders Casco Bay.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees of the Casco Bay Estuary Project.

Organization that initiated project:

Maine Department of Environmental Protection

Major environmental problems:

- Water quality impacts from storm water and combined sewer overflows
- Habitat impacts from development
- Water quality and human health impacts from individual wastewater systems (septic systems)
- Living resource impacts from existing sediment contamination
- Lack of public stewardship

Actions taken or proposed: Casco Bay was selected for inclusion in the National Estuary Program in 1990. A preliminary management plan for the bay has been developed, and a final Comprehensive Conservation and Management Plan with recommendations for priority corrective actions to restore and maintain the estuarine resources is due in September 1995. To date, a series of implementation and demonstration projects have been undertaken, including:

- The Agricultural Stabilization and Conservation Service distributed over $200,000 in cost-share funds in Casco Bay watershed to address agricultural nonpoint source pollution.
- A public education campaign provided information on the need to restore eroding stream banks along the Pleasant River. Volunteers performed the restoration work.
- A training program for municipal officials was developed to provide information on nonpoint source pollution and best management practices.
- Administrative structures to ensure the inspection and maintenance of septic systems are being evaluated.
- A storm water management plan for a town center is under development to demonstrate storm water control planning in areas designated as growth areas under local zoning ordinances.

Stakeholders:

Business and industry
Environmentalists
Farmers and foresters
Fishing industry
Homeowners
Local, state, and federal officials
Marina operators
Realtors and land developers

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Blackstone River

Size and location: The Blackstone River is located in south-central Massachusetts and flows from Worcester, Massachusetts, to the Seekonk River in Pawtaucket, Rhode Island. The Blackstone has a total length of 77 kilometers (48 miles) with a drainage area of 1400 square kilometers (540 square miles). The river is the second largest freshwater tributary to the Narragansett Bay. The Blackstone River is an important natural, recreational, and cultural resource to both Rhode Island and Massachusetts. In 1986, the U.S. Congress established the Blackstone River Valley National Heritage Corridor along portions of the river in both Massachusetts and Rhode Island.

Nature of EPA involvement: EPA has provided funding and technical assistance to the States of Massachusetts and Rhode Island to develop a wet- and dry-weather total maximum daily load (TMDL) for toxics consistent throughout the mainstem of the Blackstone River. EPA also has undertaken extensive water quality sampling in the watershed with the states.

Organization that initiated project:

U.S. Environmental Protection Agency, based on recommendations from Massachusetts and Rhode Island

Major environmental problems:

- Industrial and municipal discharges
- Water withdrawal
- Heavily contaminated sediments

Actions taken or proposed: Both Massachusetts and Rhode Island have adopted numeric and whole effluent water quality criteria and antidegradation provisions in their state water quality standards. Strict water-quality-based permits have been issued to major wastewater dischargers and combined sewer overflow strategies are being implemented. The following actions have been taken or are currently under way:

- Historic analysis of existing water quality data.
- Collection of dry-weather data.
- Calibration of a dissolved oxygen model to include impacts from phosphorus and nitrogen.
- Calibration of trace metals model for the development of a daily load TMDL and waste load allocation (WLA).
- Collection of wet-weather data to determine annual wet weather loads to Narragansett Bay as well as intermediate locations along the river, and the identification of water quality hot spots to target best management practices.

In addition to the above, the Massachusetts Executive Office of Environmental Affairs has initiated a technical assistance program that is providing pollution prevention assistance to industries to assist them in reducing the use of toxic materials. The assistance is provided by a nonregulatory state office and consists of various activities including multimedia evaluations, economic evaluations, educational materials, seminars and workshops, and identification of alternative chemicals and process technologies. The U.S. Army Corps of Engineers, as part of its Section 22 Planning Assistance to States Program, has funded a study to investigate the feasibility of restoring anadromous fish and enhancing waterfowl habitat along the Blackstone River.

The State of Rhode Island has completed a Comprehensive Conservation and Management Plan for Narragansett Bay that includes recommendations for the Blackstone. The Commonwealth of Massachusetts is including the Blackstone in its Watershed Permitting Plan.

Stakeholders:

Commonwealth of Massachusetts
Environmental, recreation, cultural, and watershed organizations
Local governments
Local industries and utilities
New England Interstate Water Pollution Control Commission
State of Rhode Island
U.S. Army Corps of Engineers
U.S. Department of the Interior
U.S. Environmental Protection Agency
U.S. Geological Survey
University of Rhode Island

Lake Champlain

Size and location: Lake Champlain is located in the northeastern United States. Its basin includes portions of Vermont, northeastern New York, and the Province of Quebec, Canada. The lake is 177 kilometers (110 miles) long and 19 kilometers (12 miles) wide at its widest. The total area of the basin is over 21,000 square kilometers (8200 square miles).

Nature of EPA involvement: EPA has provided funding and technical support for the study of Lake Champlain. Furthermore, EPA chairs the Lake Champlain Management Conference and participates in a number of its committees.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Toxics in lake sediments, with elevated levels in Malletts and Cumberland Bays and Burlington Harbor
- Eutrophication, caused by both point and nonpoint sources, affects water quality and causes increased plant growth in the bays
- Phosphorus, especially from nonpoint sources
- Consumption advisories due to contaminated fish
- Non-native nuisance aquatic vegetation and fauna, e.g., zebra mussels

Actions taken or proposed: Planning actions date to the 1940s. In 1979 the New England River Basin Commission performed a Level B Study.

In 1988, New York, Vermont, and the Province of Quebec signed a Memorandum of Understanding (MOU) on Environmental Cooperation on the Management of Lake Champlain. Important accomplishments include the creation of Citizen Advisory Committees to advise agencies on public concerns and opinions about lake management and facilitating the adoption of consistent phosphorus standards in the lake. The MOU was renewed in 1992.

In 1989, EPA awarded a Clean Lakes Program grant for a Phase I diagnostic/feasibility study, which is nearing completion, under the joint administration of the New York State Department of Environmental Conservation and the Vermont Agency of Natural Resources. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

The Lake Champlain Management Conference was established under Title 3 of the Great Lakes Critical Program Act of 1990, the Lake Champlain Special Designation Act of 1990. Comprising 31 representatives from both sides of the lake, including federal, state, and local governments; local interest groups; and citizens, its goal is to develop a Pollution Prevention, Control and Restoration Plan. A Program Office funded through the conference has been established in Grand Isle, Vermont, and funding provides for education, research, monitoring, planning, and demonstration projects.

Stakeholders:

Academic Institutions
Anglers
Audubon Society
Businesses
Environmental groups
Farmers
Lake Champlain Chamber of Commerce
Lake Champlain Committee
Lake Champlain Research Consortium
Lake George Commission
Local citizens
Local watershed groups
National Park Service
States of Vermont and New York
Tourists
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

Buzzards Bay

Size and location: Buzzards Bay is located in southeastern Massachusetts. It has a surface area of 591 square kilometers (228 square miles) and a watershed area of 1119 square kilometers (432 square miles).

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the Buzzards Bay Program.

Organizations that initiated project:

U.S. Environmental Protection Agency
Massachusetts Executive Office of Environmental Affairs

Major environmental problems:

- Nitrogen enrichment
- Toxic pollutants
- Pathogenic contamination of shellfish

Actions taken or proposed: Buzzards Bay was selected for inclusion in the National Estuary Program in 1987. A Comprehensive Conservation and Management Plan that recommends priority corrective actions to restore and maintain the estuarine resources has been developed. Actions accomplished include:

- Development of nitrogen loading limits for localized embayments.
- Establishment of a tri-town nitrogen management district.
- Creation of a toxic use reduction program for the highly industrialized New Bedford area.
- Establishment of a boat "no discharge area" for the waters in the towns of Wareham and Westport.
- Completion of two storm water remediation projects and partial completion of four others.
- Establishment of a Mutual Aid Compact for Oil Spill Containment among the 12 municipalities surrounding Buzzards Bay.
- Establishment of a tri-town health district.

Stakeholders:

Anglers
Boaters
Citizens
Coastal property owners
Environmental organizations
Industry
Local governments
Massachusetts Executive Office of Environmental Affairs
Naturalists
Tourists
U.S. Environmental Protection Agency

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Lake Champlain Advance Planning Area

Size and location: Northwestern Vermont—Chittenden, Franklin, Grand Isle, and Addison Counties. This project covers about 2600 square kilometers (1000 square miles) (260,000 hectares/650,000 acres) in northwestern Vermont of the 20,700-square-kilometer (8,000-square-mile) Lake Champlain basin.

Nature of EPA involvement: Designed and implemented field sampling protocols and accuracy assessment of Landsat Thematic Mapper-derived land use/land cover map. EPA is supporting the state wetlands program implementation to identify and protect the most valuable and threatened wetlands in the study area.

Organization that initiated project:

Wetland Protection Section, EPA New England Region

Major environmental problems: The wetlands of the 26 towns composing this area were previously identified as under the greatest threat from direct and cumulative development impacts. This project will better protect the hydrologic, habitat, and biodiversity functions and values of this region's aquatic environment. These wetlands provide the full gamut of hydrological and biological functions and human-centered values. Approximately one-third of endangered and threatened plants and one-half of the animals are dependent on Lake Champlain basin wetlands.

Action taken or proposed: The project has completed an accuracy assessment of land use/cover map for study area. Two University of Vermont graduate students have completed theses using this data set. A 104(b)(3) wetlands grant was given to the state to implement this project beginning in fall 1994. Goals include determining and better protecting the most valuable and threatened wetlands of this study area. Documentation and technology transfer of the methodology may encourage application throughout the entire Lake Champlain basin. Compilation of existing wetland and critical habitat information and determining an optional inventory methodology for the entire basin have been identified as the top priority for these resources. An extensive public outreach effort will be mounted once study products are available to involve people in the planning process. Local, regional, state and federal agencies will be encouraged to utilize this information and strengthen protection of valuable and threatened aquatic resources.

Stakeholders:

Citizens
EPA New England Region
Lake Champlain Basin Program
Local municipalities
Regional Planning Authorities
State of Vermont Wetlands Program
USFWS Cooperative Research Unit
Vermont School of Natural Resources

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Green Spaces Healthy Places Project

Size and location: 31-block area within the Roxbury/North Dorchester area of Boston, Massachusetts.

Nature of EPA involvement: Provide technical assistance to a National Service Corporation team and a community development organization for the following:

- Creation of lead-safe zones. Priority areas are identified with input from the neighborhood community organizations.
- Reduction of indoor environmental health risks to Public Housing Authority residents
- Building capacity for environmental accountability at the community level.
- Demonstration of energy efficiency and water conservation.

Organizations that initiated project: EPA New England and City Year, a community outreach/service organization, entered into a cooperative agreement to secure a grant from Americorps.

Major environmental problems: Density of listed hazardous waste sites (54 within a 3.9-square kilometer/1.5-square mile area); lead and hazardous waste in soil within the 31-block project area; pest management; and energy inefficiencies due to infrastructure and lifestyle.

Actions being taken or proposed:

- The fall component—green spaces development: to clear two vacant lots and transform them into a resource for and with the community. One lot will be a community garden, and the other could become a community composting center
- Indoor health hazards, energy conservation—healthy places development: Energy audits in targeted buildings. Based on the findings the team will retrofit lights, water, and insulation. Conduct indoor health hazards audits and appropriate environmentally sound remediation in a public housing development in Roxbury.

Stakeholders:

Americorps
City Year
Community residents
Corporate partners

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New York Sea Grant Extension Program
New York State Department of Environmental Conservation
New York State Department of State
North Fork Environmental Council
Northeast Utilities
Pfizer, Inc.
Sound Keeper
Sound Waters
State University of New York at Stony Brook
University of Connecticut
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Long Island Sound

Size and location: Long Island Sound is 177 kilometers (110 miles) long and 34 kilometers (21 miles) wide. The Sound stretches from the Battery in Manhattan to the Race at the eastern end of Long Island.

Nature of EPA involvement: Program coordination and oversight; participation in management conference committees and technical work groups; and funding assistance.

Organizations that initiated project:

New York State Department of Environmental Conservation
Connecticut Department of Environmental Protection
U.S. Environmental Protection Agency

Major environmental problems:

- Hypoxia (low dissolved oxygen)
- Toxic substance contamination
- Pathogen contamination
- Floatable debris
- Threats to habitat and living resources
- Land use and development resulting in habitat loss and degraded water quality

Actions taken or proposed: The Long Island Sound Study (LISS) was selected for inclusion in the National Estuary Program in 1987. A Management Conference was convened, and the members of the Management Conference developed a Comprehensive Conservation and Management Plan (CCMP) for the Sound that recommends priority corrective actions to restore and maintain the resources of the Sound. The CCMP was approved by the LISS Policy Committee on March 1, 1994. The governors of New York and Connecticut and the Administrator of EPA signed both the CCMP and a special implementation agreement on September 26, 1994.

The Management Conference is implementing a phased agreement to reduce nitrogen loads to Long Island Sound. In 1990, to prevent continued declines in dissolved oxygen levels, the LISS Policy Committee called for a freeze on point and nonpoint source nitrogen loadings to the Sound in key geographic areas at 1990 levels. This "no net increase" policy is being implemented by the States of Connecticut and New York through consent orders and permit modifications. Phase II, detailed in the CCMP, includes significant, low-cost nitrogen reductions of 18.6 percent to begin the process of reducing the severity and extent of hypoxia. Phase III actions will be developed over the next year to identify additional nitrogen reductions needed to meet the long-term dissolved oxygen goals.

Other activities include:

- Reviewing municipal and industrial discharge permits to surface waters to reduce the allowable concentrations of toxic pollutants from the previous permitted values.
- Implementing combined sewer overflow abatement programs in areas affecting Long Island Sound to decrease pathogen contamination and floatable debris.
- Developing enforceable policies to control storm water in areas where it causes closures of bathing beaches and shellfish beds.
- Encouraging public participation in activities related to the cleanup and protection of the Sound and providing support for activities including storm drain stenciling, beach grass planting, and beach cleanups.

Stakeholders:

Association of Marine Industries
Citizen's Campaign for the Environment
Connecticut Department of Agriculture/ Aquaculture Division
Connecticut Department of Environmental Protection
Connecticut Sea Grant Marine Advisory Program
Empire State Marine Trade Association
Interstate Sanitation Commission (NY/NJ/ CT)
Long Island Sound Foundation
Long Island Sound Keeper
Long Island Sound Taskforce
Long Island Sound Watershed Alliance
National Audubon Society

Merrimack River

Size and location: The Merrimack River has a 13,000-square-kilometer (5,010-square-mile) watershed located in New Hampshire and Massachusetts.

Nature of EPA involvement: EPA has been an active participant, as well as the primary funding source, for the project. The project is an example of "holistic" watershed management and provides an opportunity for the Agency to explore how to address environmental problems from that viewpoint.

Organizations that initiated project:

U.S. EPA
States of New Hampshire and Massachusetts
New England Interstate Water Pollution Control Commission

Major environmental problems:

- Combined sewer overflows
- Nonpoint source pollution
- Toxics
- Loss of wetlands and habitats
- Increasing demand for water

Actions taken or proposed: In an effort to reach out to stakeholders or user groups in the watershed and to better define the issues, the Merrimack River Watershed Consortium was held in February 1992. As a result of the Consortium, a Management Committee and four issue-oriented subcommittees were formed. The Management Committee and subcommittees include federal, state, regional, and local interest group representatives. The subcommittee issues are water quality, instream flow, information management/geographic information system (GIS), and resource use and value.

On June 7-8, 1993, the first annual Merrimack River Watershed Management Conference, "Solutions for the Future . . . Actions for the Present," was held. More than 200 people attended the conference and contributed to the development of a draft Watershed Management Plan. In fiscal year 1993 the initiative had approximately $400,000 in funding. This funding was used for staffing the initiative and pursuing a variety of priority projects determined by the subcommittees and Management Committee. These include a resource use and value inventory of the watershed, water quality assessment, hydrologic analysis, communication strategy, two pilot subwatershed studies, hydrographic coding of the watershed, and the development of GIS base maps.

Projects selected for action in fiscal year 1994 included the formation of a watershed advisory group, the development of a citizen environmental monitoring network, resource assessment, information access network, business/government forum, and biomonitoring. The second annual Watershed Management Conference was held in June of 1994. In addition, internal EPA workgroups are pursuing projects related to doing a better job of ecosystem management by integrating internal data bases, targeting compliance efforts and inspections based on where critical resources are located, addressing combined sewer overflow issues through increased public participation, and locating waste sites as an aid in local planning and priority setting.

The project will receive a final year of funding in 1995. The emphasis will be on implementation projects and outreach and education, sharing tools developed and the lessons learned in doing "holistic" watershed management. A watershed management plan with recommendations for further work will be prepared in 1995 and will assist in guiding the effort in the absence of further EPA funding.

Stakeholders:

Environmental organizations
Industry and business
Local governments
Massachusetts
National Park Service
New Hampshire
Regional planning agencies
U.S. EPA
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
USDA Natural Resources Conservation Service
Universities

Massachusetts Bays Program

Size and location: The Massachusetts Bays study area contains both Cape Cod Bay and Massachusetts Bay, which in turn consist of a myriad of smaller embayments along the entire eastern coast of Massachusetts. The bays encompass a surface area of approximately 5200 square kilometers (2000 square miles), with a contributing watershed area of about 16,000 square kilometers (6300 square miles). The watershed consists of significant portions of both Massachusetts and New Hampshire and, in particular, includes almost half of Massachusetts' 351 cities and towns.

Nature of EPA involvement: As part of the National Estuary Program, the Massachusetts Bays Program (MBP) receives $5 million over 5 years from EPA. The MBP has received funding from other EPA funding sources such as the Action Plan Demonstration Program. EPA also provides full-time technical and programmatic assistance to the MBP.

Organization that initiated project: The Massachusetts Bays Program (MBP) is a joint federal/state/local partnership initiated in 1988 with an award of $1.6 million in settlement funds from the federal lawsuit over the pollution of Boston Harbor.

Major environmental problems:

- Chemical contamination of water and sediments
- Bioaccumulation and effects of chemical contamination
- Pathogen contamination
- Impaired water quality
- Habitat loss and modification
- Sea level rise

Actions taken or proposed: The MBP was selected for inclusion in the National Estuary Program (NEP) in 1990. With NEP designation and accompanying federal funding, the MBP began development of a Comprehensive Conservation and Management Plan (CCMP) to achieve the goals of restoration and protection of water quality and enhancement of the marine resources of the bays. The CCMP, first drafted in 1991, is currently under revision. A final draft CCMP will be released in May 1995 for public review. Final publication of the CCMP is scheduled for September 1995.

The CCMP and accompanying annual work plans serve to direct numerous program activities including:

- Establishment and staffing of governing committees, such as those for Policy, Management, Steering, Technical Advisory, Local Governance, and Public Outreach purposes.
- Implementation of the CCMP on a regional, geographic basis.
- MBP-funded research, demonstration, and "Mini-Bays" projects (see next project summary).
- Protection of living resources from chemical contamination through source reduction.
- Numerous education and outreach efforts (e.g., teacher training, publication of a coastal access guide and watershed map).
- Protection and restoration of harvestable shellfish resources through storm water remediation and septic system upgrades.

Stakeholders:

Academic community
Business and industry
Commercial and recreational users such as anglers, whale watchers, boaters, swimmers
Environmental groups
Federal, state, and local government agencies
Shipping industry
Tourists
Waste disposal industry

Narragansett Bay

Size and location: Narragansett Bay is an estuary covering 381 square kilometers (147 square miles) of water surface. Its watershed comprises 4292 square kilometers (1657 square miles), 61 percent of which is in Massachusetts and 39 percent of which is in Rhode Island.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the program.

Person that initiated project:

Governor of Rhode Island

Major environmental problems:

- Toxic pollutants
- Nutrients and eutrophication
- Land-based impacts on water and habitat quality
- Declining health and abundance of living resources
- Need for fisheries management
- Adverse health risk to consumers of seafood
- Adverse environmental impacts on commercial and recreational uses

Actions taken or proposed: The Narragansett Bay was selected for inclusion in the National Estuary Program in 1987. A Comprehensive Conservation and Management Plan (CCMP) has been developed as the blueprint for immediate coordinated action by federal, state, and local implementing authorities. Recommended actions to address the problems listed above are prioritized and will be staged over a number of years to achieve measurable progress. Since the CCMP received EPA approval in January 1993, some examples of implementation activities that have been completed include:

- Development of a Marina Pumpout Siting Plan that will help lead to a request to EPA to designate the Bay as a "no discharge area."
- A Quahog (hard-shell clam) Management Plan for Greenwich Bay.
- A regulatory review to identify and resolve inconsistencies in state policies regarding water quality issues.
- Revision of the state's individual sewage disposal system regulations and industrial pre-treatment regulations.

Stakeholders:

Environmental advocacy groups
Federal, state, and local government agencies
Industry
Land development interests
Local citizens
Marine trade organizations
Universities

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Massachusetts Bays Program/Mini-Bays Project

Size and location: The Mini-Bays Project includes the following three areas:

- Wellfleet Harbor on Cape Cod (24.6 square kilometers/9.5 square miles)
- Fore River Estuary, just south of Boston in Braintree, Quincy, and Weymouth (13 square kilometers/5 square miles)
- Plum Island Sound and Rivers System on the north shore of Boston (18 square kilometers/7 square miles)

Nature of EPA involvement: As a subsidiary of the Massachusetts Bays Program (MBP), the Mini-Bays Project receives $50,000 per year from EPA and limited staff support.

Organization that initiated project:
Massachusetts Bays Program (MBP)

Major environmental problems:

- Wellfleet Harbor: pathogens and excessive nutrients, which threaten a nationally known oyster population
- Fore River Estuary: chemical and pathogenic contaminants, the control of which could improve shellfish beds in a historically industrialized area
- Plum Island Sound: pathogen contamination from existing and future development, which endangers the nationally famous Ipswich clam

Actions taken or proposed: With a 5-year funding commitment from the MBP, each Mini-Bays project has developed a plan of action, has created management and advisory committees, and has actively begun identifying pollution sources. Additional effort has included and will include the development and implementation of cost-effective corrective actions, the establishment of monitoring programs (typically staffed by volunteers), and the generation of local support. Specific examples of these efforts include creation of the Plum Island Sound volunteer monitoring program and reseeding of oyster beds in Wellfleet Harbor.

Stakeholders:
Academic community
Business and industry
Commercial and recreational users such as anglers, whale watchers, boaters, swimmers
Environmental groups
Federal, state, regional, and local governments
Shipping industry
Tourists
Waste disposal industry

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Waquoit Bay

Size and location: Waquoit Bay is located on the southern shore of Cape Cod, Massachusetts. The bay and its watershed encompass an area of approximately 52 square kilometers (20 square miles); 6.5 square kilometers (2.5 square miles) of this area is surface water.

Nature of EPA involvement: EPA has provided funding for the Waquoit Bay project and is assisting in conducting an ecological risk assessment on the bay.

Organizations that initiated project:

National Oceanic and Atmospheric Administration
National Science Foundation
U.S. EPA

Major environmental problems:

- Enrichment of the bay's water with excess amounts of nitrogen
- Decline in water quality
- Loss of eelgrass beds
- Decline of shellfish
- Increase in fish kills and mats of macroalgae

Actions taken or proposed: The Land-Margin Ecosystems Research Project was initiated to determine the relationship between land use and water quality. Land uses and nutrient loadings were characterized; physical, chemical, and biological processes occurring in the bay and surrounding subwatersheds were determined; and a geographic information system and a variety of models were developed to understand the links between land use and impacts observed in Waquoit Bay. Research results are being fed into an easy-to-use "management model" that calculates steady state nitrogen loading rates for various scenarios. The model is intended to be specific enough to make predictions about Waquoit Bay and general enough to be used in other embayments depending on the parameters selected. It is important that the model be more than locally applicable since nitrogen is a pervasive problem along much of the East Coast.

Stakeholders:

Association for the Preservation of Cape Cod
Cape Cod Commission
Citizens for the Protection of Waquoit Bay
Massachusetts Department of Environmental Protection
Massachusetts Executive Office of Environmental Affairs
National Oceanic and Atmospheric Administration
National Science Foundation
Towns of Falmouth and Mashpee
Universities
Boston University
Hampshire College
Smith College
University of Southern California
U.S. EPA
U.S. Geological Survey
Waquoit Bay National Estuarine Research Reserve
Woods Hole Oceanographic Institute

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New Bedford Harbor Watershed Assessment Project

Size and location: The Acushnet (New Bedford Harbor) and Slocums Rivers Basin are sub-basins of the Buzzards Bay, Massachusetts, watershed. The total study area is about 288 square kilometers. The embayment-only (i.e., water surface) areas of the New Bedford and Slocums Rivers are 73.3 square kilometers and 5.5 square kilometers, respectively.

Nature of EPA Involvement: The overall goal of this project is to conduct research that will improve our ability to understand, quantify, and predict the cumulative effects of multiple anthropogenic stresses on the productivity and sustainability of coastal marine ecosystems. Ultimately, this research will provide a generic management tool that can be used to make decisions supporting specific regulatory programs (e.g., Superfund) in the context of watershed-level ecological effects. This research will utilize an integrated information and data assessment approach geographic information system (GIS) to produce quantitative characterizations of waste streams and other anthropogenic activities that act as cumulative stressors in the marine environment. Corresponding characterization of ecological responses will provide a better understanding of the cause-effect relationships between categories of major stressor and ecological effects. The intent of this research is to provide an ability to predict the outcome of regulatory management decisions on watershed-level measurable changes in coastal water bodies.

The initial phase of this work, approximately 2 years in duration, involves a comparative study that focuses on an "impacted" watershed (more appropriately termed a sub-basin), New Bedford Harbor (New Bedford, MA), and an "unimpacted" watershed, Slocums River (Dartmouth, MA). New Bedford Harbor was selected because this system is about to undergo significant stressor and ecological changes as a result of Superfund remediation at this site. In addition, an upgrade of the sewage system in the near future will alter this waste stream. This will allow a unique opportunity to field-verify laboratory models and predictions. The Slocums River estuary was selected as a reference site because it has similar physiographic characteristics to NBH, is uncontaminated, and is in close proximity. This will provide a point of comparison for assessing the degree of recovery achieved in New Bedford as a result of alteration of the various stressor waste streams.

This research will be accomplished through three tasks. First, the current physical, chemical, and biological features of each sub-basin will be characterized. Secondly, the current anthropogenic sources and ecological condition of each sub-basin will be characterized. Next, system-level stress-response relationships will be determined and predictions of environmental alterations (i.e., remediation) on ecological changes and recovery will be made. Verification of this process will occur through cooperative efforts initiated with the U.S. Army Corps of Engineers, New England Division (COE-NED), and EPA New England Region.

Organizations that initiated project:

Ecosystem Research Branch, U.S. EPA
Environmental Research Laboratory-Narragansett

Major environmental problems:

- Polychlorinated biphenyls (PCBs)
- Metals
- Wastewater effluent

Actions taken or proposed: Phased remediation and restoration through dredging and disposal of harbor sediments contaminated with PCBs and metals.

Stakeholders:

U.S. Army Corps of Engineers
U.S. EPA: New England Region and Superfund
State of Massachusetts
Cities of New Bedford and Fairhaven, Massachusetts
Local citizens and environmental groups
Fishing industry

Region II Projects

Example projects submitted by Region II include the 26 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on watersheds but these vary among lakes, rivers, and estuaries/sounds. Several projects are based on "Area of Concern" designation, which involves the U.S./Canada boundary's important or sensitive areas. Some others are Clean Lakes Program projects (see Part III). Other projects are based on large lakes and their watersheds, tropical lakes (in Puerto Rico), waste sites, and wetlands in an urbanizing area. Eutrophication and algae blooms, toxics, heavy metals, sediment, storm water/urban runoff, wetlands and habitat loss, urban/suburban nonpoint sources, dredging destruction of aquatic/terrestrial habitat, loss of diversity, loss of recreational/water supply uses, exotic species, wildlife deformities, pathogens, hypoxia, and loss of shellfish and other harvests are reported among the problems this Region's projects seek to address. Actions taken include developing partnerships with a variety of local, state and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might develop information systems such as geographic information system (GIS); install erosion control; install or improve waste management; identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop local land management plans including sensitive area plans. Several large-scale initiatives also partly lie within Region II, including the Chesapeake Bay Program, the Mid-Atlantic Highlands Assessment (MAHA), the Mid-Atlantic Integrated Assessment (MAIA), the Atlantic Coastal Plain Aquifer System Project, the Environmental Monitoring and Assessment Program (EMAP) Mid-Atlantic Highlands Stream Assessment, the Great Lakes Program, and the Chesapeake Bay/MAIA/MAHA Landscape-Scale Assessment.

Region II projects in the Inventory at this time include:

Alcyon Lake, NJ
Barnegat Bay, NJ
Buffalo River Area of Concern, NY
Cranberry Lake, NJ
Deal Lake, NJ
Delaware Estuary, DE, NJ*

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Portsmouth Naval Shipyard Ecological Risk Assessment

Size and location: The ecological risk assessment involves the Portsmouth Harbor/Piscataqua River/Great Bay Estuary in the States of New Hampshire and Maine.

Nature of EPA involvement: The EPA Environmental Research Laboratory (ERL) in Narragansett and the Navy Environmental Research Lab (NCCOSC) Navy Interagency Agreement (IAG) jointly conduct ecological risk assessment.

Organization that initiated project:
Navy NCCOSC, San Diego Lab

Major environmental problems: Ecological risks associated with Naval activities on Seavey Island in Portsmouth Harbor. This is a RCRA and CERCLA site.

Actions taken or proposed: A full-scale ecological risk assessment was designed and conducted jointly by ERL-Narragansett and the Navy Environmental Research Lab (NCCOSC) in San Diego, CA. The final report of this study is in review.

Stakeholders:
EPA New England Region
Northern Division Naval Facilities
Naval Shipyard, Portsmouth, NH
States of New Hampshire and Maine

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Alcyon Lake

Size and location: Alcyon Lake is located in the Borough of Pitman, Gloucester County, New Jersey. The lake is 5.5 hectares (13.5 acres) in size, with a watershed of 10 square kilometers (4 square miles). The lake is 244 meters (800 feet) downstream of the LiPari landfill, a Superfund site.

Nature of EPA involvement: EPA has provided funding, grants management, and technical assistance for this project. EPA has also coordinated activities on Alcyon Lake with the nearby LiPari Superfund site.

Organization that initiated project:

Gloucester County Planning Department

Major environmental problems:

- Toxic contamination from the LiPari landfill
- Silt and organic matter from a sewage treatment plant (closed in 1972)
- Sediments, organics, and heavy metals from urban storm water runoff
- Siltation: nutrients and pesticides from agricultural sources

Actions taken or proposed: New Jersey received a Clean Lakes Program grant in 1991 to conduct a Phase I diagnostic/feasibility study for Alcyon Lake and its watershed. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect the lake's water resources.

Through the National Demonstration Program for lake water quality established under the Clean Water Act and using earmarked and competitive Clean Lakes funding, a watershed master plan will be developed and implemented. Actions to be taken might include:

- Development of a geographic information system (an interactive land management data base that uses water quality modeling to determine methods of mitigating sediment loadings).
- Installation of erosion control devices.
- Establishment of a Watershed Action Committee to technically review proposed activities.
- Design of a storm water conveyance system.
- Development of environmental ordinances and land management guidelines.

In addition, the LiPari landfill itself has been remediated through the Superfund program. The downstream wetlands and the lake itself have been included as part of the offsite remediation, and actions will include dredging and restoration of the wetlands and dredging of the lake sediments, which will deal with the in situ toxics.

Stakeholders:

Borough of Pitman
City of Gloucester
Gloucester County Planning Department
Local citizens
U.S. Environmental Protection Agency

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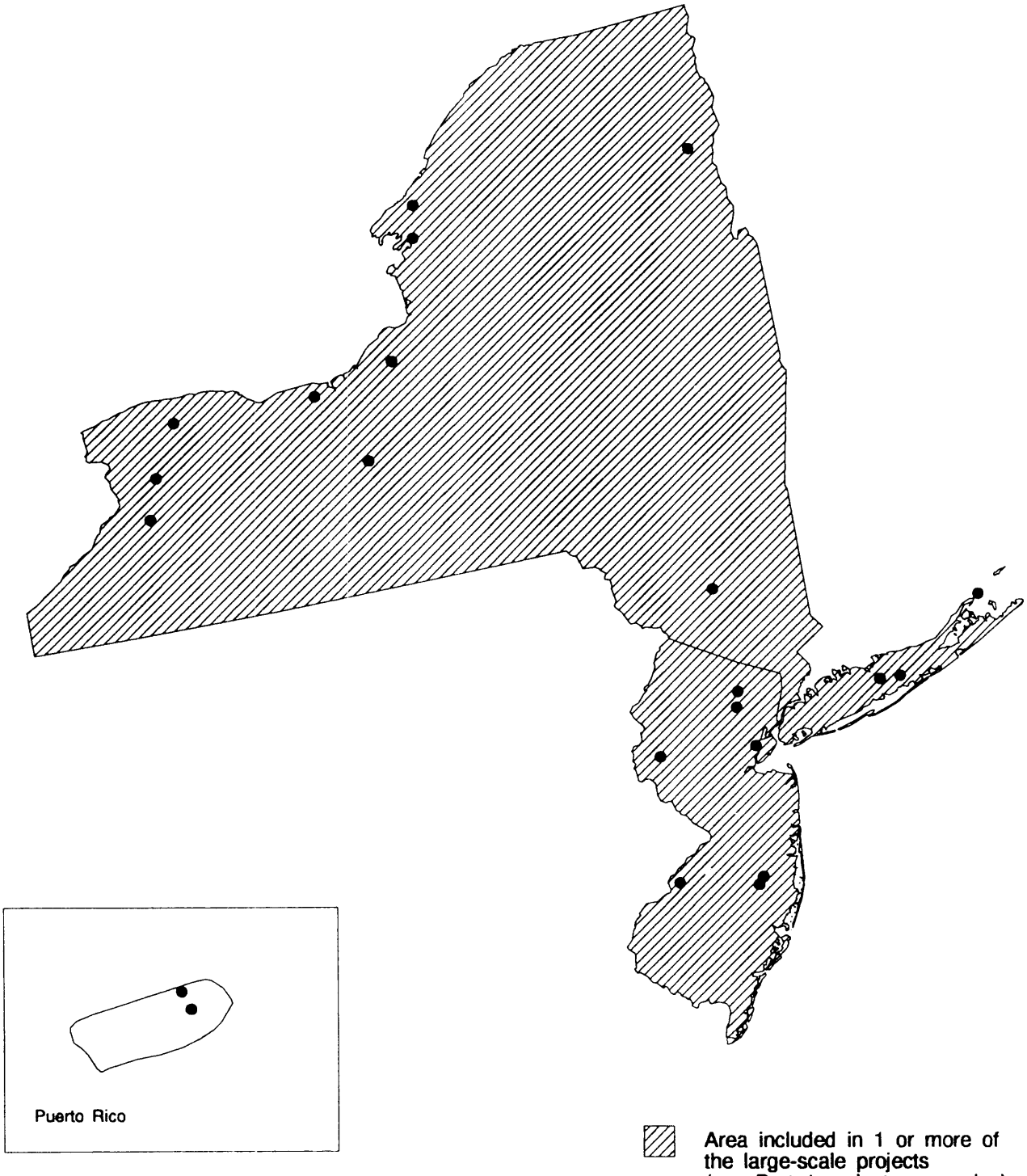
Figure 3:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 2 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale project

State Boundary

Scale 1:4,000,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-2/10
Area boundaries and reference point locations are approximate.

Buffalo River Area of Concern

Size and location: The Buffalo River Area of Concern (AOC) is located in the City of Buffalo in western New York State and extends approximately 10 kilometers (6 miles) from the mouth of the river to the east. The river discharges into Lake Erie near the head of the Niagara River.

Nature of EPA involvement: EPA's role is to integrate AOC issues into the Lake Ontario Lakewide Management Plan (LaMP) and the Niagara River Toxics Management Plan (TMP). EPA also provided funding to the New York State Department of Environmental Conservation (NYSDEC) for actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated the project:

U.S. EPA
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- PCBs, chlordane, and PAHs are impairing fishing and aquatic life
- Navigational dredging of the river and bulkheading and the alterations of the shoreline have degraded fish and wildlife habitat
- Metals and cyanides in the sediment

Actions taken or proposed: The Buffalo River AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) has been developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1987. The RAP was completed in 1989 as a working document. A Remedial Advisory Committee was formed in 1990 to assist NYSDEC in RAP implementation. Actions taken to date include:

- A flow-activated sampling station was established by NYSDEC to collect samples during high-flow events. Measurements were also made at another station at the upper end of the AOC.
- EPA has developed a sediment dynamics model of the Buffalo River under the Assessment and Remediation of Contaminated Sediments Program. This model will allow the prediction of sediment scour and deposition under a variety of flow conditions in the AOC.
- A remedial waste removal action is under way at the Bern Metal site, and remedial construction action is under way at the Madison Wire site.
- NYSDEC has developed a plan to assess existing habitat conditions in the Buffalo River and to identify potential habitat improvements. Field work has been initiated to compile data on existing habitat conditions in the AOC and the immediate upstream watershed. Faculty and students from New York State University have conducted physical mapping, siltation rate evaluations, and additional biological surveys.

Stakeholders:

ARO Corporation
Bern Metal
Buffalo River Citizens' Committee
Buffalo River Study Group
Dresser Industries
Erie County Department of Environment and Planning
Friends of the Buffalo River
Madison Wire
New York State Department of Environmental Conservation
Other industries
U.S. Environmental Protection Agency

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Eighteenmile Creek Area of Concern, NY
Greenwood Lake, NJ, NY
Hackensack Meadowlands District, NJ
Lake Champlain, NY, VT*
Lake La Plata, PR
Lake Loiza, PR
Lake Musconetcong, NJ
Lake Ontario Toxics Management Plan, NY, Ontario
Long Island Sound, CT, NY*
New York City Water Supply Watersheds, NY
New York-New Jersey Harbor, NJ, NY
Niagara River Area of Concern, NY
Niagara River Toxics Management Plan, NY
Onondaga Lake, NY
Oswego River Harbor Area of Concern, NY
Peconic Bay, NY
Rochester Embayment Area of Concern, NY
St. Lawrence River Area of Concern, NY
San Juan Bay, PR
Swartswood Lake, NJ

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Deal Lake

Size and location: Deal Lake is located in eastern Monmouth County, New Jersey. The lake is 58 hectares (143 acres) with a watershed of 496 hectares (1,228 acres).

Nature of EPA involvement: EPA has provided funding, grants management, and technical assistance.

Organization that initiated project: Deal Lake Commission (a substate agency under the Land Use Planning Law of New Jersey), in conjunction with the neighboring towns.

Major environmental problems:

- Upstream and urban development causing increased nutrient and sediment loads
- Filling in of some shallower areas of the lake
- Accelerated weed growth
- Algal blooms, which produce odor problems when rotting
- Bacteria levels that exceed bathing criteria

Actions taken or proposed: A state-funded diagnostic/feasibility study was completed in 1983. It developed a three-step approach:

(1) The upgrading or development ordinances and zoning requirements dealing with soil erosion control, storm water quality management, and proper watershed/land use management.

(2) The identification of all existing sources of erosion and implementation of the ordinances or avoidance of development.

(3) The construction of detention basins.

The Harvey Brook arm of the lake was restored in 1988. The demonstration project included several sediment-nutrient control projects, the identification of sensitive environmental areas, and the development of environmental ordinances and rezoning. The Deal Lake Commission has developed agreements with the five watershed municipalities and meets on a regular basis to discuss watershed activities.

In 1989, New Jersey was awarded a Clean Lakes Program Phase II Restoration/ Implementation grant for Deal Lake. This project will implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. Permits are being obtained for construction of sedimentation basins funded through the Clean Lakes Program, and a preliminary draft of the sensitive land management plan is under review.

Stakeholders:

Asbury Park
County Mosquito Commission
Deal Lake Commission
Interlaken
Local citizens
Neptune Township
Ocean Township
Tourists
Town of Deal
U.S. Environmental Protection Agency

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Barnegat Bay

Size and location: Barnegat Bay is a 194-square-kilometer (75-square-mile) estuarine system, with Ocean County, New Jersey, as the northern boundary and New Jersey Route 72 as the southern boundary.

Nature of EPA involvement: EPA has provided funding and technical assistance.

Organizations that initiated project:

New Jersey Department of Environmental Protection (NJDEP)
Ocean County Board of Chosen Freeholders
Bay Area Municipalities

Major environmental problem:

Degraded water quality caused by:

- Nonpoint source loadings caused by development on land and the activities associated with development (e.g., vehicle use, lawn and garden maintenance, septic systems)
- Boat populations
- Wildlife populations

Actions taken or proposed: In 1987 the New Jersey Legislature passed a law requiring the study of the nature and extent of development impacts on the bay. As a result of that study, a draft Watershed Management Plan for Barnegat Bay was completed by the New Jersey Department of Environmental Protection (NJDEP) in April 1992. The watershed management plan is being reviewed with all of the municipalities within the watershed to solicit their support and to make changes in local zoning and subdivision regulations, where needed, to effectively implement the management plan watershed-wide.

In support of this effort, Clean Water Act funds are being used to demonstrate best management practices (BMPs), determine the effectiveness of BMPs, and perform intensive monitoring.

Stakeholders:

Boroughs of Barnegat Light, Bay Head, Beachwood, Harvey Cedars, Island Heights, Lavallette, Mantoloking, Ocean Gate, Pine Beach, Point Pleasant, Point Pleasant Beach, Seaside Heights, Seaside Park, Ship Bottom, South Toms River, and Surf City
New Jersey Department of Environmental Protection
Ocean County Board of Chosen Freeholders
Townships of Barnegat, Berkeley, Brick, Dover, Lacey, Long Beach, Ocean, and Strafford

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Private organizations
The States of Delaware, New Jersey, and Pennsylvania
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Cranberry Lake

Size and location: Cranberry Lake is located in Byram Township, New Jersey. The lake is 77 hectares (190 acres) in size, with a mean depth of 2.1 meters (6.9 feet) and a maximum depth of 4.6 meters (15.1 feet). The watershed is 733 hectares (1814 acres), including the lake.

Nature of EPA involvement: EPA has provided funding, grants management, and technical assistance.

Organization that initiated project:
Byram Township, New Jersey

Major environmental problems:
- Excessive weed growth
- Reduced dissolved oxygen
- Sediment loading
- High in-lake phosphorus concentrations
- Excessive algal concentrations
- Reduced fish habitat
- Septic related and nonpoint source discharges
- Sediment infilling

Actions taken or proposed: New Jersey received a Clean Lakes Program Phase II Restoration/Implementation grant in 1992 for Cranberry Lake. This project will implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. Activities being supported by this funding include:
- Control of future land development through a sensitive lands management plan.
- Weed harvesting.
- Storm sewer management.
- Correction of existing soil erosion problems.

Stakeholders:
Byram Township
Cranberry Lake Community Club
New Jersey Department of Environmental Protection
Sussex County Planning Department
Tourism
U.S. Environmental Protection Agency

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Greenwood Lake

Size and location: Greenwood Lake is located in Orange County, New York, and Passaic County, New Jersey. The lake is 776 hectares (1,920 acres) in size, 15.5 kilometers (9.6 miles) long, and 1.9 kilometers (1.2 miles) wide, with a mean depth of 5 meters (17 feet) and a maximum depth of 17 meters (57 feet). The watershed is 96 square kilometers (37 square miles), exclusive of the lake.

Nature of EPA involvement: EPA has provided funding, grants management, and technical assistance.

Organization that initiated the project:
U.S. Congress

Major environmental problems:
- Massive weed growth in parts of the lake
- Floating stumps that form a hazard to navigation
- Anoxic conditions in the summer months
- Erosion from development, causing sedimentation at river mouths
- Taste and odor problems
- Nonpoint stormwater runoff
- Septic and point source discharges
- Internal phosphorus cycling

Actions taken or proposed: In 1980, New Jersey received a Clean Lakes Program grant to conduct a Phase I diagnostic/feasibility study for Greenwood Lake and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality. A management plan was developed. This plan recommended:
- Weed harvesting.
- Lake drawdown.
- Construction of storm water quality management structures.
- Septic management district development.
- Sensitive lands management plan.
- Public education.

In 1989, Phase II Clean Lakes Program grants were awarded to New Jersey and New York for Greenwood Lake. Phase II projects implement in-lake restoration work, as well as critical watershed management activities to control nonpoint source pollution to the lake. The Phase II projects will translate the Phase I recommendations into action.

Stakeholders:
Greenwood Lake Improvement Committee
Greenwood Lake Watershed Managementt District, Inc.
New Jersey Department of Environmental Protection
New York State Department of Environmental Conservation
New York/New Jersey Departments of Transportation
Orange County Planning Commissioner
Orange County Soil and Water Conservation District
Save the Lake Action Committee
Tourism
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
Warwick and Greenwood Lake, NY
West Milford, NJ

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NY:
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Division of Water
NYSDEC
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FAX: (518) 457-1088

Delaware Estuary

Size and location: This project focuses on the tidal portion of the Delaware River between the falls at Trenton, New Jersey, and the mouth of the Delaware Bay (between Cape May, New Jersey, and Cape Henlopen, Delaware). The project area, however, encompasses the entire river basin.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding to the Program. EPA (Regions II and III) also provides technical and programmatic support by the commitment of four full-time employees. Additional management and staff support is provided on an as-need basis.

Organizations that initiated project: The States of Pennsylvania, New Jersey, and Delaware petitioned EPA for inclusion of the Delaware Estuary in the National Estuary Program.

Major environmental problems:

- Toxics in sediments, fish, and birds
- Loss of diversity and loss and fragmentation of certain habitat types
- Nonpoint source pollution
- Water use: supply, quality, and allocation

Actions taken or proposed: The Delaware Estuary was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan is currently being developed for the Delaware Estuary that advocates a watershed protection approach in implementing the action plans. It will provide a basinwide perspective in managing land use, toxics, habitat protection, and water use issues.

One project already under way is the mapping of habitat for priority species throughout the estuary. The maps will be designed for use by local governments to help them protect habitat through improved planning procedures. Land uses and practices appropriate for such areas, coordination of interstate management plans, and inclusion of the important species in Environmental Impact Statements will be proposed. Interstate fish advisories will be coordinated, and loading limits for selected toxicants (total maximum daily loads) will be established. The program will provide technical support for watershed-based land planning for storm water management and nonpoint source control.

The program is also developing a nonpoint source plan that will assist states in prioritizing watersheds, an action plan to address the impacts of toxics on fisheries and raptors, and an action plan for restoration of urban stream corridors. The program is proposing development of a long-term environmental policy plan that would integrate environmental concerns into decision-making by all sectors of society to achieve sustainable development.

Other activities include:

- Examining potential water supply shortages in certain areas of the Delaware basin (such as the Potomac-Raritan-Magothy aquifer system and the Triassic lowland bedrock aquifers) and encouraging protective action by water and wastewater utilities.
- Providing tools and technical assistance to local governments in support of improved land use planning.
- Encouraging and providing incentives for increased regional planning.
- Improving coordination of water supply planning to address water quantity and quality planning.
- Addressing toxics loadings from ground water and nonpoint sources.
- Developing a regional information management service that will facilitate sharing of information.
- Continuing and expanding the ongoing public participation program.
- Coordinating and expanding the monitoring program of the three states.

Stakeholders:

Anglers
Business and industry
Commercial fishing
Environmental groups
Local and regional agencies
Local citizens
National Oceanic and Atmospheric Administration

Hackensack Meadowlands District

Size and Location: The Hackensack Meadowlands District (HMD) is a 83-square-kilometer (32-square-mile) area covering portions of 14 municipalities in northeastern New Jersey. This district comprises much of the lower tidal area of the Hackensack River watershed. The undeveloped areas within the HMD are primarily wetlands (approximately 3400 hectares/8500 acres) and are under substantial developmental pressure. In spite of a long history of pollution and degradation, the Meadowlands support significant wildlife populations, particularly migrating and wintering waterfowl.

Nature of EPA involvement: EPA has provided some support funding as well as serving as co-lead agency for developing an Environmental Impact Statement.

Organization that initiated project:

Hackensack Meadowlands Development Commission

Major environmental problems:

- Development pressure
- Significant land, water and air contamination requiring remediation.

Actions taken or proposed: EPA, U.S. Army Corps of Engineers, Hackensack Meadowlands Development Commission, the National Oceanic and Atmospheric Administration, and the New Jersey Department of Environmental Protection and Energy agreed, by entering into a Memorandum of Understanding (MOU) on March 14, 1988, to prepare and implement a Special Area Management Plan (SAMP) for the HMD. The MOU requires the preparation of an Environmental Impact Statement on the SAMP and the development of appropriate regulatory products (e.g., Clean Water Act (CWA) section 404 wetlands general permits and/or an abbreviated permit process and advance CWA section 404(c) actions). The goals of the SAMP, derived from the MOU, are (1) to provide for natural resource protection and reasonable economic growth and (2) to provide a program of environmental benefits for the district. The completed SAMP will facilitate compliance with all applicable environmental statutes and regulations.

The SAMP is described in detail in the Environmental Impact Statement, which should be available for public review in early 1995. The plan contains the following elements: (1) designation of a maximum of 340 hectares (840 acres) of wetlands for development and transportation improvements (770 hectares/1900 acres total designated for development) with over (1400 hectares/3400 acres) of wetlands designated for enhancement/restoration. (2) Permanent protection of the remaining 3070 hectares (7600 acres) of wetlands in the district not proposed for development via deed restrictions, transfer of development rights, outright purchase, etc. Property owners whose wetland properties are designated for preservation could be compensated for any loss of development rights through several financial mechanisms outlined in the SAMP. (3) A $1 billion program of environmental cleanup, enhancement, and management in one of the most polluted areas of New Jersey. (4) Regulatory products, which include a proposed general permit for section 404 activities in certain specified areas, streamlined permit processes for all other SAMP-consistent projects, and a mitigation agreement, along with several proposed mitigation banks, to increase regulatory certainty and facilitate the implementability of section 404 requirements under the SAMP. Finally, because the SAMP has been developed for the lower watershed, and includes all future development in the Meadowlands, it has been possible to perform a comprehensive and cumulative impacts analysis for this highly impacted but still significant ecological resource.

Stakeholders:

Hackensack Meadowlands Development Commission
National Oceanic and Atmospheric Administration
New Jersey Department of Environmental Protection and Energy
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

Eighteenmile Creek Area of Concern

Size and location: This Area of Concern (AOC) is defined as Eighteenmile Creek and Olcott Harbor, on the southwestern shore of Lake Ontario in New York.

Nature of EPA involvement: EPA's role is to integrate AOC issues into the Lake Ontario Lakewide Management Plan (LaMP) and the Niagara River Toxics Management Plan (TMP). EPA also provided funding to the New York State Department of Environmental Conservation (NYSDEC) for actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- Contaminated sediments
- Contaminated fish
- Loss of habitat in the lower reach of the Eighteenmile Creek

Actions taken or proposed: The Eighteenmile Creek AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in March 1994. The Stage I Report on problem definition is in progress and is projected to be completed in 1995. A Remedial Action Committee has been formed to assist NYSDEC in RAP development. Meanwhile, some projects that had been planned on a Lake Ontario-wide basis are resulting in actions that impact the Eighteenmile Creek AOC. For example, NYSDEC is developing pollution prevention regulations to require implementation of "Toxic Chemical Reduction Plans" for facilities that generate certain amounts/types of hazardous wastes or toxic chemicals. Some industries in the Eighteenmile Creek AOC have already taken the initiative to institute pollution prevention practices.

Stakeholders:

New York State Department of Environmental Conservation
U.S. Environmental Protection Agency

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Lake Champlain

Size and location: Lake Champlain is located in the northeastern United States. Its basin includes portions of Vermont, northeastern New York, and the Province of Quebec, Canada. The lake is 177 kilometers (110 miles) long and 19 kilometers (12 miles) wide at its widest. The total area of the basin is over 21,000 square kilometers (8200 square miles).

Nature of EPA involvement: EPA has provided funding and technical support for the study of Lake Champlain. Furthermore, EPA chairs the Lake Champlain Management Conference and participates in a number of its committees.

Organization that initiated project:

U.S. Congress

Major environmental problems:

- Toxics in lake sediments, with elevated levels in Malletts and Cumberland Bays and Burlington Harbor
- Eutrophication, caused by both point and nonpoint sources, affects water quality and causes increased plant growth in the bays
- Phosphorus, especially from nonpoint sources
- Consumption advisories due to contaminated fish
- Non-native nuisance aquatic vegetation and fauna, e.g., zebra mussels

Actions taken or proposed: Planning actions date to the 1940s. In 1979 the New England River Basin Commission performed a Level B Study.

In 1988, New York, Vermont, and the Province of Quebec signed a Memorandum of Understanding (MOU) on Environmental Cooperation on the Management of Lake Champlain. Important accomplishments include the creation of Citizen Advisory Committees to advise agencies on public concerns and opinions about lake management and the facilitating the adoption of consistent phosphorus standards in the lake. The MOU was renewed in 1992.

In 1989, EPA awarded a Clean Lakes Program grant for a Phase I diagnostic/feasibility study, which is nearing completion, under the joint administration of the New York State Department of Environmental Conservation and the Vermont Agency of Natural Resources. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

The Lake Champlain Management Conference was established under Title 3 of the Great Lakes Critical Program Act of 1990, the Lake Champlain Special Designation Act of 1990. Comprising 31 representatives from both sides of the lake, including federal, state, and local governments; local interest groups; and citizens, its goal is to develop a Pollution Prevention, Control and Restoration Plan. A Program Office funded through the conference has been established in Grand Isle, Vermont, and funding provides for education, research, monitoring, planning, and demonstration projects.

Stakeholders:

Academic Institutions
Anglers
Audubon Society
Businesses
Environmental groups
Farmers
Lake Champlain Chamber of Commerce
Lake Champlain Committee
Lake Champlain Research Consortium
Lake George Commission
Local citizens
Local watershed groups
National Park Service
States of Vermont and New York
Tourists
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

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Lake La Plata

Size and location: Lake La Plata is a 4.9-square-kilometer (1.9-square-mile) lake located in the municipality of Toa Alta, near San Juan, Puerto Rico.

Nature of EPA involvement: EPA has provided funding, grants management, and technical assistance.

Organization that initiated project:
Puerto Rico Environmental Quality Board

Major environmental problems:

- Nonpoint source pollution from agricultural practices and urban development
- Extreme sedimentation rates reducing storage capacity of the reservoir
- Increased nutrient rates accelerating eutrophication
- Oxygen depletion below 4-5 meters (13-16 feet)
- Water hyacinth infestation
- Bacterial concentrations exceeding water quality standards

Actions taken or proposed: Puerto Rico received a Clean Lakes Program grant in 1981 to conduct a Phase I diagnostic/feasibility study for Lake LaPlata and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality. The overall restoration plan that was developed addressed water hyacinth harvesting, sewage improvements, and nonpoint source best management practice implementation, including animal waste treatment. The watershed is extensively used for chicken production.

In 1986 and again in 1991, Phase II Clean Water Lakes grants were awarded. The Phase II projects will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to a lake. The Phase II projects include a farmer education and agricultural inspection program and the construction of a chicken manure processing plant. The manure processing plant construction is complete. The processed manure will be sold to island flower growers as fertilizer. It is a cooperative effort with the Commonwealth's Rural Development Corporation.

Stakeholders:
Local citizens
Local government
Puerto Rico Environmental Quality Board
Puerto Rico Department of Health
Rural Development Corporation
U.S. Environmental Protection Agency

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Lake Musconetcong

Size and location: Lake Musconetcong is located in Sussex County, New Jersey. The lake is 133 hectares (329 acres) in size, with a mean depth of 1.5 meters (4.8 feet) and a maximum depth of 3 meters (10 feet). The watershed covers 5600 hectares (14,000 acres). Lake Musconetcong is upstream of Lake Hopatcong, the largest lake in New Jersey at 1085 hectares (2686 acres) and is part of its watershed.

Nature of EPA involvement: EPA has provided funding, grants management, and technical assistance.

Organization that initiated the project:

Lake Musconetcong Regional Planning Board

Major environmental problems:

- Extensive weed growth
- Nonpoint source storm runoff
- Septic and point source discharges around upstream lakes
- Internal nutrient recycling
- Accumulation of organic sediments
- Algal mat bloom

Actions taken or proposed: The immediate area around the lake has been sewered. The restoration and management plan developed as a result of the Phase I Clean Lakes project recommended the following:

- Decrease nutrient inputs from watershed sources.
- Reduce the influx of storm water related sediment loading.
- Control the growth of aquatic vegetation and mat algae.
- Deepen the lake.

Funding was provided for localized dredging, shoreline stabilization, and implementation of a storm water management program (detention basins). The lake is also a priority watershed in New Jersey. It has received Clean Water Act section 319 funding for best management practices.

Stakeholders:

Borough of Netcong
Lake Musconetcong Regional Planning Board
New Jersey Department of Environmental Protection
Tourism
Town of Stanhope
U.S. Environmental Protection Agency

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Stakeholders:

Environment Canada
Erie County, NY
Farmers and agribusinesses
New York State Department of Environmental Conservation
Ontario Ministry of Environment and Energy
U.S. Environmental Protection Agency

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Lake Loiza

Size and location: The Lake Loiza watershed covers 536 square kilometers (207 square miles) (41,000 hectares/101,380 acres) and is located in the mountains of east-central Puerto Rico. It originates in the Espino Ward in the town of San Lorenzo and flows to the Atlantic Ocean at Loiza Aldea.

Nature of EPA involvement: EPA has provided funding and technical assistance.

Organizations that initiated project:

Puerto Rico Environmental Quality Board
Soil Conservation Service
U.S. Agricultural Stabilization and Conservation Service
Cooperative Extension Service

Major environmental problems:

- High nutrient concentrations
- Bacteria
- Pesticides
- Sedimentation
- Household garbage
- Dead animals
- Polluted runoff from urban areas

Actions taken or proposed: In 1990, an Agricultural Nonpoint Source Hydrologic Unit Project Plan was submitted to and approved by the U.S. Department of Agriculture as part of its Water Quality Initiative to fund agricultural nonpoint source projects. A 4-year accelerated technical and financial assistance program is being carried out on approximately 36,050 acres of agricultural land that will be adequately treated or benefitted by the application of agricultural best management practices (BMPs). The Loiza Lake project will reduce onsite soil erosion on 4,050 acres of cropland and 26,000 acres of pasture land to an acceptable level and reduce offsite agricultural sedimentation by 85 percent or 983,350 tons per year and will reduce the amount of chemical and organic matter in the lake.

Clean Water Act funds are being used to inspect applied BMPs, determine BMP effectiveness, and carry out an intensive monitoring program.

In addition, information and education efforts will include BMP demonstration projects, field tours, training meetings, broadcast and print media, and publications and bulletins.

Stakeholders:

Este Soil Conservation District
Municipality of Aguas Buenas
Municipality of Bayamon
Municipality of Caguas
Municipality of Carolina
Municipality of Guaynabo
Municipality of Loiza
Municipality of San Lorenzo
Municipality of Trujillo Alto
Puerto Rico Association of Conservation Districts
Puerto Rico Department of Agriculture
Puerto Rico Environmental Quality Board
Turabo Soil Conservation District

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National Oceanic and Atmospheric Administration
New York City Department of Environmental Protection
New York Sea Grant Extension Program
New York State Department of Environmental Conservation
New York State Department of State
North Fork Environmental Council
Northeast Utilities
Pfizer, Inc.
Sound Keeper
Sound Waters
State University of New York at Stony Brook
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Geological Survey
University of Connecticut
Westchester County Department of Environmental Facilities
Westchester County Department of Planning
USDA Natural Resources Conservation Service (NRCS)

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Lake Ontario Toxics Management Plan

Size and location: Lake Ontario lies at the downstream end of the chain of Great Lakes. It is the smallest of the Great Lakes in terms of surface area (19,000 square kilometers/7340 square miles, 7.8 percent of the total Great Lakes surface area). It has a land drainage area of 64,000 square kilometers (24,720 square miles 12.2 percent of the Great Lakes drainage area). It is the second deepest lake with a 86-meter (282-foot) average depth and an 244-meter (800-foot) maximum depth, but its volume (1,651 cubic kilometers/393 cubic miles) surpasses only that of Lake Erie.

Nature of EPA involvement: Active role in expanding focus of actions from toxic chemicals to ecosystem impacts (e.g., fish and wildlife population degradation and habitat loss) by incorporating the Lake Ontario Toxics Management Plan into the Lakewide Management Plan (see below).

Organizations that initiated the project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)
Environment Canada (EC)
Ontario Ministry of Environment and Energy (MOEE)

Major environmental problems:

- Restrictions on fish and wildlife consumption due to PCBs, dioxin, DDT, and mirex
- Degradation of fish and wildlife populations, as well as bird and animal deformities or reproductive problems due to PCBs, dioxin, DDT, & dieldrin
- Drinking water taste and odor problems due to algae or bacteria

Actions taken or proposed: Under the Great Lakes Water Quality Agreement between the United States and Canada, a Lakewide Management Plan (LaMP) for Critical Pollutants is being developed for Lake Ontario. The primary goal of the LaMP is to reduce both point and non-point source loadings that are causing or have the potential to cause beneficial use impairments.

In addition, a Declaration of Intent was signed in 1987 by EPA, EC, NYSDEC, and MOEE, initiating the Lake Ontario Toxics Management Plan (LOTMP) to reduce toxics loadings to the lake. Actions that have been taken to date under the LaMP and LOTMP include:

- EPA has initiated a pilot Clean Sweep project in Erie County to assist farmers to safely dispose of stores of their banned or unregistered pesticides. About 77 farmers and agribusinesses participated, resulting in the collection of approximately 3400 kilograms (7500 pounds) of toxic contaminants. The Clean Sweep project is being extended to neighboring counties and to the Great Lakes basinwide to make the program self-sustaining without additional federal funds.
- EPA and NYSDEC have begun multimedia (air, water, land) inspections at industrial and municipal facilities to evaluate opportunities for implementing pollution prevention techniques. In the 1994 fiscal year, of the 223,000 kilograms (491,000 pounds) of pollutants that had been emitted by seven facilities (estimated through their permits and waste reports), approximately 97,000 kilograms (212,800 pounds) (43 percent) were eliminated as a results of the facilities implementing the techniques identified in the inspections.
- EPA has completed Assessment and Remediation of Contaminated Sediments Program demonstration projects designed to evaluate and demonstrate numerous remedial treatment technologies for the control and removal of toxic pollutants in the Great Lakes, with emphasis on the removal of toxic pollutants from bottom sediments. A demonstration project was completed in the Lake Ontario Basin on the Buffalo River. The remedial treatment technology was successful in removing over 80 percent of the polynuclear aromatic hydrocarbons present in the sediment sample.

New York City Water Supply Watersheds

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Long Island Sound

Size and location: Long Island Sound is 177 kilometers (110 miles) long and 34 kilometers (21 miles) wide. The Sound stretches from the Battery in Manhattan to the Race at the eastern end of Long Island.

Nature of EPA involvement: Program coordination and oversight; participation in management conference committees and technical work groups; and funding assistance.

Organizations that initiated project:

New York State Department of Environmental Conservation
Connecticut Department of Environmental Protection
U.S. Environmental Protection Agency

Major environmental problems:

- Hypoxia (low dissolved oxygen)
- Toxic substance contamination
- Pathogen contamination
- Floatable debris
- Threats to habitat and living resources
- Land use and development resulting in habitat loss and degraded water quality

Actions taken or proposed: The Long Island Sound Study (LISS) was selected for inclusion in the National Estuary Program in 1987. A Management Conference was convened, and the members of the Management Conference developed a Comprehensive Conservation and Management Plan (CCMP) for the Sound that recommends priority corrective actions to restore and maintain the resources of the Sound. The CCMP was approved by the LISS Policy Committee on March 1, 1994. The governors of New York and Connecticut and the Administrator of EPA signed both the CCMP and a special implementation agreement on September 26, 1994.

The Management Conference is implementing a phased agreement to reduce nitrogen loads to Long Island Sound. In 1990, to prevent continued declines in dissolved oxygen levels, the LISS Policy Committee called for a freeze on point and nonpoint source nitrogen loadings to the Sound in key geographic areas at 1990 levels. This "no net increase" policy is being implemented by the States of Connecticut and New York through consent orders and permit modifications. Phase II, detailed in the CCMP, includes significant, low-cost nitrogen reductions of 18.6 percent to begin the process of reducing the severity and extent of hypoxia. Phase III actions will be developed over the next year to identify additional nitrogen reductions needed to meet the long-term dissolved oxygen goals.

Other activities include:

- Reviewing municipal and industrial discharge permits to surface waters to reduce the allowable concentrations of toxic pollutants from the previous permitted values.
- Implementing combined sewer overflow abatement programs in areas affecting Long Island Sound to decrease pathogen contamination and floatable debris.
- Developing enforceable policies to control storm water in areas where it causes closures of bathing beaches and shellfish beds.
- Encouraging public participation in activities related to the cleanup and protection of the Sound and providing support for activities including storm drain stenciling, beach grass planting, and beach cleanups.

Stakeholders:

Association of Marine Industries
Citizen's Campaign for the Environment
Connecticut Department of Agriculture/ Aquaculture Division
Connecticut Department of Environmental Protection
Connecticut Sea Grant Marine Advisory Program
Empire State Marine Trade Association
Interstate Sanitation Commission (NY/NJ/ CT)
Long Island Sound Foundation
Long Island Sound Keeper
Long Island Sound Taskforce
Long Island Sound Watershed Alliance
National Audubon Society

Niagara River Area of Concern

Size and location: The Niagara River Area of Concern (AOC) is located in Erie and Niagara Counties in western New York. The AOC extends from Smokes Creek near the southern end of the Buffalo Harbor north to the mouth of the Niagara River at Lake Ontario.

Nature of EPA involvement: EPA's role is to integrate AOC issues into the Lake Ontario Lakewide Management Plan (LaMP) and the Niagara River Toxics Management Plan (TMP). EPA also provided funding to the New York State Department of Environmental Conservation (NYSDEC) for actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- Impairment of habitat and survival of aquatic life by PCBs, mirex, chlordane, dioxin, hexachlorobenzene, polynuclear aromatic hydrocarbons, lead, mercury, tetrachloroethylene, and pesticides
- Fish tumors and other deformities
- Metals and cyanides in the sediment prevent open lake disposal of bottom sediments dredged from the river

Actions taken or proposed: The Niagara River AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1989, and the final draft was completed in March 1993. A Remedial Advisory Committee will be formed to assist NYSDEC in RAP implementation. Actions that have been taken to date include:

- Upstream (Fort Erie) and downstream (Niagara-on-the-Lake) water quality monitoring to estimate pollutant loadings is ongoing.
- Scheduled remedial actions at Occidental Chemical's Buffalo Avenue and Durez sites, DuPont's Necco Park and Buffalo Avenue sites, Bell Aerospace, and CECOS International have resulted in an estimated 25 percent reduction in loadings from waste sites in the Niagara River basin.
- Remedial actions on Gill Creek were completed in 1992.
- NYSDEC is developing pollution prevention regulations to require implementation of Toxic Chemical Reduction Plans for facilities that generate certain amounts/types of hazardous wastes or toxic chemicals. Many industries have already taken the initiative to institute pollution prevention practices.

Additional actions taken in this AOC are included in the summary of projects undertaken for the Niagara River Toxics Management Plan, which covers a larger, but similar area.

Stakeholders:

Bethlehem Steel
Buffalo Sewer Authority
Columbus-McKinnon
DuPont-Necco Park
Environment Canada
INS Equipment
New York State Department of Environmental Conservation
Niagara River Action Committee
Occidental Chemical
Ontario Ministry of Environment and Energy
Other industries
U.S. Environmental Protection Agency

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New York City Water Supply Watersheds

Size and location: The water supply for the City of New York is composed of three systems. Together, these systems provide water for 8 million residents in New York City, as well as 1 million residents north of the city. The Catskill and Delaware systems (Schoharie, Cannonsville, Pepacton, Ashokan, Neversink, and Rondout Reservoirs) lie west of the Hudson River, covering an area of approximately 5200 square kilometers (2000 square miles). The Kensico and West Branch Reservoirs of the Catskill/Delaware systems (plus the independent Croton system) lie east of the Hudson River.

Nature of EPA involvement: EPA, under the Safe Drinking Water Act, formalized the New York City Department of Environmental Protection's Watershed Protection Program as one of the conditions for allowing New York drinking water supply to remain unfiltered. One goal is to reduce microbial contamination. EPA has provided oversight of the Watershed Protection Program, technical assistance, and grants for rebuilding treatment facilities.

Organization that initiated project:
New York City

Major environmental problems:
- Nonpoint source contamination from residential and commercial development
- Runoff from dairy farming operations
- Discharges from wastewater treatment plants

Actions taken or proposed: On December 30, 1993, EPA issued a Determination granting filtration avoidance to New York City for the Catskill and Delaware systems. The Determination, which is effective until a further Determination is made or until December 15, 1996, requires New York City to comply with more than 150 conditions. These conditions mainly consist of steps to further enhance watershed protection. Some actions being taken include:
- Water quality inventory, surveillance, and monitoring.
- Promulgation of new watershed regulations.
- Partnership programs with watershed communities and the farm community.
- Kensico Reservoir coliform remediation.
- Upgrading of New York City-owned and non-city-owned sewage treatment facilities.
- Septic tank review, inspection, and remediation.
- Enhanced enforcement of water quality regulations.
- Land acquisition.
- Stream corridor protection.

The New York City Department of Environmental Protection is undertaking these actions either directly or by providing funding to others.

Stakeholders:
Building Contractor Association of Westchester & the Mid-Hudson River
Catskill Center
Catskill Committee of the Sierra Club
City Club of New York
City of New York
Coalition of Watershed Towns (representing all towns in the five west of Hudson counties)
Congressman Boehlert
Congressman Fish
Congresswoman Lowey
Environmental Defense Fund
Hudson Riverkeeper
Natural Resources Defense Council
New York State Bar Association, Environmental Law Committee
New York State Department of Environmental Conservation
New York State Department of Health
Pure Water Alliance
Putnam County Legislature
Sierra Club - New York City Group
U.S. Environmental Protection Agency
Westchester County
Woodstock Times/Huguenot and Highland Herald Publisher

tion and environmental releases, waste minimization achievements to date, potential waste minimization opportunities, and facility response to the evaluation.

Stakeholders:

Bell Aerospace
City of Niagara Falls
DuPont
Environment Canada
New York State Department of Environmental Conservation
Occidental Chemical
Ontario Ministry of Environment and Energy
Other industries
U.S. EPA
U.S. Geological Survey

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New York-New Jersey Harbor

Size and Location: The core area for this project is defined as the New York-New Jersey Harbor from the area up to and including the Hudson River near Piermont Marsh to the Sandy Hook-Rockaway Point Transect, the Harlem and East Rivers to Hellgate, and all other tributaries to the head of tide. The core area is encompassed within an approximately 80-kilometer (50-mile) diameter circle centered on the Upper Bay of New York-New Jersey Harbor. For planning purposes, the New York Bight Apex along with the New Jersey and Long Island coasts to 4.8 kilometers (3 miles) offshore and the Hudson River to the limit of anadromous fish spawning are considered within the study area.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the program.

Organizations that initiated project:

New Jersey Department of Environmental Protection
New York State Department of Environmental Conservation

Major environmental problems:

- Floatable debris
- Pathogenic contamination
- Toxic contamination
- Nutrient and organic enrichment
- Habitat loss and degradation

Actions taken or proposed: The New York-New Jersey Harbor was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan (CCMP) that recommends priority corrective actions to restore and maintain the resources of the Harbor is being developed. The draft CCMP is expected to be released to the public in 1994. The final CCMP is due to EPA and the governors of New York and New Jersey by June 1, 1995, and EPA's Administrator is expected to approve the CCMP in September 1995. Actions identified to date include:

- Floatables Action Plan.
- Beach/Shellfish Bed Closure Action Plan.
- Site-Specific Water Quality Standard for copper.
- Wasteload allocations for toxic metals.

Stakeholders:

Citizens' groups
Interstate Sanitation Commission
Local governments, including New York City
National Oceanic and Atmospheric Administration
New Jersey Department of Environmental Protection
New York State Department of Environmental Conservation
Port Authority of New York and New Jersey
Scientific and technical community
U.S. Army Corps of Engineers
U.S. Department of the Interior
U.S. Environmental Protection Agency

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- Expand the hydrodynamic model for the lake outlet to include the lake and Seneca River.

Implementation of the plan will involve the targeted use of existing regulatory programs within the geographic confines of Onondaga Lake. As a result of regulatory programs, a number of administrative orders, court orders, and pending lawsuits are directed at the many sources of pollution in the lake. Very important among these actions is the court order addressing the Metropolitan Syracuse Wastewater Treatment Plant (METRO) and combined sewer overflows (CSOs) on the lake.

Stakeholders:

City of Syracuse
New York State Department of Environmental Conservation
New York State Department of Law
Onondaga County
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Niagara River Toxics Management Plan

Size and location: The Niagara River is a 60-kilometer (37-mile) channel that connects Lake Erie to Lake Ontario. Divided into upper and lower reaches by Niagara Falls, it provides 83 percent of the total tributary flow to Lake Ontario.

Nature of EPA involvement: EPA has had an active role in tracking implementation of Niagara River Toxics Management Plan (NRTMP) and reporting progress to the public. EPA also has provided funding to the New York State Department of Environmental Conservation (NYSDEC) for NRTMP actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated project:

U.S. EPA
New York State Department of Environmental Conservation (NYSDEC)
Environment Canada (EC)
Ontario Ministry of Environment and Energy (MOEE)

Major environmental problems:

- Impairment of habitat and survival of aquatic life by polychlorinated biphenyls (PCBs), mirex, chlordane, dioxin, hexachlorobenzene, polynuclear aromatic hydrocarbons, lead, mercury, tetrachloroethylene, and pesticides
- Fish tumors and other deformities
- Metals/cyanides in sediments prevent open lake disposal of bottom sediments dredged from river

Actions taken or proposed: A Declaration of Intent was signed in 1987 by EPA, EC, NYSDEC, and MOEE initiating the Niagara River Toxics Management Plan (NRTMP) to reduce toxics loadings to the Niagara River. Actions that have been taken to date include:

- In 1989, EPA and NYSDEC identified the Falls Street Tunnel as responsible for over 50 percent of the aggregate point source loadings (from the United States to the Niagara River) of the 10 persistent toxic chemicals targeted for significant reductions by the NRTMP. In 1993, the U.S. Department of Justice lodged a settlement in Federal Court that commits the City of Niagara Falls to treat all the dry-weather flow. Construction to divert the entire dry-weather flow to the Niagara Falls wastewater treatment plant was completed on schedule, and treatment of the toxic chemicals has been confirmed.
- Over 5800 cubic meters (7600 cubic yards) of highly contaminated sediment was removed from Gill Creek, eliminating, among other pollutants, an estimated 0.2-kg-per-day (0.4-pound-per-day) load of PCBs to the Niagara River. This magnitude of loading is approximately 20 percent of the loading measured from the Niagara River to Lake Ontario.
- EPA and NYSDEC identified 24 waste sites responsible for 99.9 percent of the estimated toxic loads from all sites and developed ambitious clean-up schedules for them. In June 1994, the agencies reported that remediations at eight sites have resulted in an estimated 25 percent reduction in these loads. By 1996, scheduled remedial actions will reduce the estimated toxic loads by 89 percent.
- Approximately 22,000 cubic meters (29,000 cubic yards) of contaminated sediments were removed from Bloody Run Creek, also associated with leachate from the Hyde Park landfill. Substances removed included chlorobenzene, hexachlorobenzene, and low levels of dioxin. The creek was relined with clean gravel.
- EPA has carried out inspections at Niagara River basin facilities for waste minimization activities on behalf of the Niagara Frontier Program. EPA targeted facilities that discharge either NRTMP priority toxics or toxics that are highly bioaccumulative. EPA's reports include descriptions of facility manufacturing processes, waste genera

Oswego River Harbor Area of Concern

Stakeholders:

Auburn, Canadaigua, Fulton, Geneva, Ithaca, Newark, Oswego, and Onondaga Counties
Bristol Myers Squib
Citizens' Advisory Committee
New York State Department of Environmental Conservation
Niagara Mohawk and other hydroelectric utilities
U.S. Environmental Protection Agency

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Onondaga Lake

Size and location: Onondaga Lake is located along the northern end of the City of Syracuse in Onondaga County, New York. The lake covers an area of 11.9 square kilometers (4.6 square miles). The lake receives water from a drainage basin of 648 square kilometers (248 square miles), located almost entirely within Onondaga County.

Nature of EPA involvement: EPA has provided funding and technical assistance and has participated in the Onondaga Lake Management Conference.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Excessive nutrient loading from a large municipal discharge causing eutrophic and low-oxygen conditions
- Combined sewer overflows of untreated sewage and debris, generating bacteria concerns
- Mercury and other hazardous materials in the sediment, water, and biota from past manufacturing operations
- Low dissolved oxygen levels, high turbidity levels, elevated levels of ammonia and salinity, reduced plant life, unsuitable substrate, and the presence of mercury, which have adversely affected aquatic organisms.
- Sediment loading from the Tully Valley Mudboils

Actions taken or proposed: In 1989 Congress appropriated funds for EPA to convene a management conference for Onondaga Lake. Subsequently, the Great Lakes Critical Programs Act of 1990 called for the establishment of a management conference for the restoration, conservation, and management of Onondaga Lake and called for the development of a comprehensive restoration, conservation, and management plan for Onondaga Lake that recommends priority corrective action and compliance schedules for the cleanup of the lake. The Management Conference consists of all federal, state, local, public, and private interests. Management Conference projects include:

- Developing a eutrophication model for the Seneca River.
- Developing a lake productivity model.
- Developing a hydrodynamic model for the lake outlet.
- Funding studies on the release of nutrients and toxic substances from lake sediments under changing dissolved oxygen levels.
- Establishing a long-term baseline water quality program.
- Drafting an urban/suburban nonpoint source pollution plan.
- Drafting a fish and wildlife management plan.
- Developing a demonstration project of manipulated littoral zone habitat structures that indicated that fencing and wave breaks could significantly increase plant survival, growth, and diversity and that these habitats also increase survival of young-of-the-year fish.

Future projects proposed for Onondaga Lake include:

- Evaluate, and update on a regular basis, the contamination status of lake organisms.
- Develop and implement a biological monitoring program.
- Implement the rural nonpoint source pollution plan.
- Develop a public education plan.
- Conduct pilot projects to implement flow modification and sediment load reduction in the Tully Valley Mudboil area.
- Implement a large-scale macrophyte planting project.
- Reconnect fragmented wetlands area to Onondaga Lake to provide vital fish spawning and young-of-the-year fish nursery areas.
- Study the role of vegetation in mercury cycling.

South Town Baymen's Association
Southampton Town Baymen's Association
State University of New York - Stony Brook
Suffolk Community College
Suffolk County Department of Health Services
Suffolk County Planning Department
Suffolk County Soil and Water Conservation District
Soil Conservation Service
The Nature Conservancy
Town of Brookhaven Division of Environmental Protection
Towns of East Hampton, Southampton, Shelter Island, Riverhead, and Southold
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Food and Drug Administration
U.S. Geological Survey

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Office of Ecology
Suffolk County
Department of County Center
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FAX: (516) 852-2092

Oswego River Harbor Area of Concern

Size and location: The Oswego River Harbor Area of Concern (AOC) is located on the southeastern shore of Lake Ontario and is centered in the City of Oswego, New York.

Nature of EPA involvement: EPA's role is to integrate AOC issues into the Lake Ontario Lakewide Management Plan (LaMP) and the Niagara River Toxics Management Plan (TMP). EPA also provided funding to the New York State Department of Environmental Conservation (NYSDEC) for actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated the project:

New York State Department of Environmental Conservation (NYSDEC)
U.S. Environmental Protection Agency

Major environmental problems:

- Restrictions on fish and wildlife consumption primarily due to PCBs and dioxin
- Loss of fish and wildlife habitats caused by periodic extreme low-flow conditions below the Varick Dam, contributing to the degradation of fish populations
- Eutrophication and reported algal blooms, which have been attributed to excess phosphorus from municipal discharges, combined sewer overflows (CSOs), and agricultural runoff
- Pollutants of concern from identified sources in the basin are polychlorinated biphenyls (PCBs), dioxin, phosphorus, mercury, mirex/photo-mirex, and octachlorostyrene

Actions taken or proposed: The Oswego River Harbor AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1987. The Stage I Report, which describes the nature and extent of problems, was completed in 1990. The Stage II Report was completed in 1991 and includes a remedial strategy to restore water quality in the lower river and harbor and to eliminate adverse impacts to Lake Ontario from pollutants carried by the Oswego River. A Remedial Advisory Committee (RAC) was then formed to represent all stakeholders and assist NYSDEC in RAP implementation. Actions that have been taken to implement the recommendations of the Stage II Report include:

- Under a recent settlement and enforcement action, Bristol Myers Squib in East Syracuse agreed to implement a $30 million upgrade of its pretreatment facilities and to conduct site investigations and pollution prevention activities.
- EPA and NYSDEC are jointly overseeing the implementation of eight Approved Pretreatment Programs in the Oswego Basin.
- Modeling of Onondaga Lake and Three Rivers (Oswego, Seneca, and Oneida) is well under way and is to be used to determine loadings, additional upgrade needs, and CSO needs.
- Implementation of remedial actions is under way at the Clothier and Quanta Resources hazardous waste sites. Clothier involves drum and soil contamination removal. Quanta involves additional monitoring to determine whether interim remedial measures are effective and sufficient. Remedial Investigation/Feasibility Studies are in progress at seven other sites, including Onondaga Lake and Ley Creek PCB sites, as prerequisites to remedial action.
- NYSDEC is working with Niagara Mohawk and other hydroelectric utilities to allow restricted fish passage at Oswego River facilities and to resolve minimum flow problems at Varick Bypass. Estimated completion is 1995.

generate certain amounts/types of hazardous wastes or toxic chemicals. Many industries have already taken the initiative to institute pollution prevention practices.

Stakeholders:

City of Rochester
Genesee Basin Subcommittee - Government Policy Group
Lake Ontario Central/Irondequoit Basin/Lake Ontario West Basin Subcommittees
Monroe County Department for Planning and Development
New York State Department of Environmental Conservation
U.S. Environmental Protection Agency

Contact:

Alice Yeh
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Peconic Bay

Size and location: The surface area of Peconic Bay is about 520 square kilometers (200 square miles). The estuary lies between the twin forks of eastern Long Island, New York.

Nature of EPA involvement: EPA representatives serve as chairs of the Policy and Management Committees and provide technical and administrative support to the Technical Advisory Committee, Citizens Advisory Committee, and Local Government Committee. EPA also provides financial support, including grants under the National Estuary Program, and the Near Coastal Water and Wetlands Programs.

Organization that initiated project:
Suffolk County Department of Health Services

Major environmental problems:

- Nuisance algal bloom that destroyed the once-important scallop fishery and has impacted other shellfish, finfish, and their nursery areas
- Nutrients in the western areas of the bay
- Pathogens from point and nonpoint sources

Actions taken or proposed: Peconic Bay was selected for inclusion in the National Estuary Program in 1992. A Comprehensive Conservation and Management Plan (CCMP) that will recommend priority corrective actions to restore and maintain the estuarine resources is being developed for the bay. Actions that have been taken in the bay include:

- Freezing the nitrogen load from sewage treatment plants at current levels.
- Remediating nonpoint source nutrient pollution from a local duck farm.
- Replanting scallops to recovering areas.
- Planting grass buffer strips to control pathogen contamination due to road runoff.
- Remediating wetland habitats.
- Constructing boat pump-out facilities.
- Adopting a total nitrogen surface water quality guideline for the western area of the Bay.

Stakeholders:

Accabonic Protection Committee
ACT NOW!/Promoting Community Awareness
Association of Marine Industries
Brookhaven National Labs
Concerned Citizens of Montauk
Cornell Cooperative Extension Association of Suffolk County
East Hampton Historical Society
East Hampton Town Baymen's Association
Group for the South Fork
Harbor Marina
Larry's Lighthouse Marine
League of Women Voters
Long Island Farm Bureau, Inc.
Long Island Pine Barrens Association
Long Island Regional Planning Board
Long Island University
Long Island Water Commission
Modern Yachts
Montauk Boatman and Captain's Association
Montauk Chamber of Commerce
Montauk Harbor Association
National Oceanic and Atmospheric Administration
New Suffolk Civic Association
New York Sea Grant
New York State Department of Environmental Conservation
New York State Department of State
New York State Department of Transportation
North Fork Bank
North Fork Environmental Council
Office of the Suffolk County Executive
Okeanos Ocean Research Foundation
Peconic Land Trust
Red Cedar Point Association
Riverhead Conservation Advisory Council
Seafood Harvesters Association of New York
Shelter Island Baymen's Association
Shinnecock Marlin & Tuna Club

St. Lawrence River Area of Concern

Stakeholders:

ALCOA
Environment Canada
General Motors
International Joint Commission
Massena Citizen Advisory Committee
New York State Department of Environmental Conservation
Ontario Ministry of Environment and Energy
Other industries
Reynolds Metals
The Mohawks at Akwesasne
U.S. Environmental Protection Agency

Contact:

Alice Yeh
U.S. EPA Region II
26 Federal Plaza
New York, NY 10278
(212) 264-1865
FAX: (212) 264-2194

Rochester Embayment Area of Concern

Size and location: The Rochester Embayment Area of Concern (AOC) is an area of Lake Ontario formed by the indentation of the Monroe County shoreline between Bogus Point (Town of Greece) and Nine Mile Point (Town of Webster). The southern boundary includes approximately 10 kilometers (6 miles) of the Genesee River that is influenced by lake levels, from the river's mouth to the Lower Falls. The drainage area of the embayment is over 12,500 square kilometers (4828 square miles) in area.

Nature of EPA involvement: EPA's role is to integrate AOC issues into the Lake Ontario Lakewide Management Plan (LaMP) and the Niagara River Toxics Management Plan (TMP). EPA also provided funding to the New York State Department of Environmental Conservation (NYSDEC) for actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated project:

Monroe County Department of Planning and Development (MCDPD)
U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- Restrictions on fish and wildlife consumption
- Degradation of fish and wildlife populations and loss of habitat
- Bird and animal deformities or reproduction problems
- Eutrophication or undesirable algae and beach closings
- Restrictions on drinking water or taste and odor problems

(The above impairments are caused by mirex and dioxin; polychlorinated biphenyls and chlordane from past use; polycyclic aromatic hydrocarbons from coal gas production; heavy metals and cyanide from industrial dischargers; coliform, ammonia, phosphorus, and sediment from the watershed; and phenols.)

Actions taken or proposed: The Rochester Embayment AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1988. The Stage I Report, which describes the nature and extent of the problems, has been completed, and the Stage II Report, which identifies remedial actions and implementation methods, is under way. Actions that have been taken to implement the recommendations of the Stage II Report include:

- A Combined Sewer Overflow (CSO) Abatement Program has been implemented to construct underground storage tunnels to intercept CSOs before they enter the Embayment and the Genesee River. The tunnel system conveys the wastewater in the combined sewers to the Van Lare Wastewater Treatment Facility before it enters the lake. The number of annual overflows at 30 previous overflow locations has been dramatically decreased from 60 to 2 or less.
- The Irondequoit Bay Oxygen Supplementation Project is a water quality/habitat enhancement project whose goal is to improve the control of phosphorus by both chemical processes (increased oxygen, which enhances the natural system of adsorption/precipitation with iron oxides) and biological means (reduced phosphorus deposition through algal harvesting by fish). To revitalize the cold-water fishery in the bay, introduction of oxygen into the deep waters will both accelerate natural ecosystem recovery and cause an immediate improvement in fisheries habitat.
- NYSDEC is developing pollution prevention regulations to require implementation of Toxic Chemical Reduction Plans for facilities that

Swartswood Lake

Size and location: Swartswood Lake is located in a state park in Sussex County, New Jersey. The lake is 204 hectares (504 acres) in size, with a mean depth of 6.7 meters (22 feet) and a maximum depth of 128 meters (42 feet). The watershed covers 4,523 hectares (11,196 acres), including the lake.

Nature of EPA involvement: EPA has provided funding grants management, and technical assistance.

Organization that initiated project:

Sussex County Board of Freeholders

Major environmental problems:

- High in-lake phosphorus
- Reduced fish habitat
- Excessive weed/algal growth
- Anoxia caused by internal phosphorus recycling
- Reduction in clarity

Actions taken or proposed:

- Inactivation of internal phosphorus by hypolimnetic aeration
- Weed harvesting
- Development of a septic management plan
- Implementation of homeowner best management practices
- Control of future land development

Stakeholders:

New Jersey Department of Environmental Protection
Stillwater Township
Sussex County Board of Freeholders
Sussex County Department of Planning
Tourism
U.S. Environmental Protection Agency

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FAX: (212) 264-2194

State:
Budd Cann
Water Monitoring Management
NJ Department of Environmental Protection
(CN427)
Trenton, NJ 08625
(609) 292-0427
FAX: (609) 633-1095

St. Lawrence River Area of Concern

Size and location: The St. Lawrence River Area of Concern (AOC) begins above the dams at the Massena Village, New York, water intake and follows the river downstream to the international boundary with Canada. It also includes portions of the Grasse, Raquette, and St. Regis Rivers.

Nature of EPA involvement: EPA's role is to integrate AOC issues into the Lake Ontario Lakewide Management Plan (LaMP) and the Niagara River Toxics Management Plan (TMP). EPA also provided funding to the New York State Department of Environmental Conservation (NYSDEC) for actions aimed at improving ecosystem health by reducing toxic contamination.

Organizations that initiated project:

New York State Department of Environmental Conservation (NYSDEC)
U.S. Environmental Protection Agency

Major environmental problems:

- Restrictions on fish and wildlife consumption caused mainly by PCBs, mercury, mirex, and dioxin
- Loss of fish and wildlife habitats caused by physical disturbances and contaminated sediments

Actions taken or proposed: The St. Lawrence River AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1988. The Stage I Report, completed in 1990, identified use impairments, their causes, and sources. The Stage II Report was completed in 1991 and includes the development of remedial strategies to (1) restore water quality and use impairments of the tributary rivers and St.Lawrence River, and (2) eliminate adverse impacts to the AOC from sources of pollutants at major hazardous waste sites. A Remedial Advisory Committee (RAC) was then appointed to represent all stakeholders and assist NYSDEC in RAP implementation. Actions that have been taken to implement the recommendations of the Stage II Report include:

- Following EPA's issuance of an Administrative Order, BALCOA has agreed to remediate all sites on its approximately 1400-hectare (3460-acre) plant at an estimated cost of up to $150 million, for approximately 8 years. A secure landfill is to be completed by 1995 at a cost of $36 million.
- EPA released a proposed remedial project to remove 32,600 cubic meters (42,650 cubic yards) of PCB-contaminated St. Lawrence River sediments next to the Reynolds Metals Plant site for treatment and disposal in a specially prepared upland site on Reynolds property. The estimated cost of the work is $36.7 million. Reynolds has initiated the design phase for this work.
- A significant reduction in the mass of PCBs discharged from Massena industries has been achieved by the installation of wastewater treatment systems, implementation of best management practices (BMPs), and interim remediation activities.
- Interim wastewater treatment systems at ALCOA designed to remove PCBs and other contaminants from various waste streams, including the sanitary lagoon effluent, have been placed in operation. Eventually, all contaminated storm water and process water will receive appropriate treatment.
- NYSDEC has completed nonpoint source assessment reports for each New York State county. A Priority Water Problem list has been prepared to rank impaired waterbodies. Various BMPs, including storm water management and agricultural methods, have been recommended.

Region III Projects

Example projects submitted by Region III include the 18 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on watersheds of inland rivers and streams, but others involve estuaries/coastal waters, solid waste handling areas, an interstate joint planning area, and a habitat protection initiative. Urban and agricultural nonpoint source problems, habitat fragmentation and loss, contaminated sediments, nutrient enrichment, toxics, threats to water supply/recreational uses and aquatic communities, off-road vehicles in sensitive areas, acid mine drainage, dams, point sources, toxic effects on wildlife, eutrophication, loss of seafood harvests, conflicting land uses, streambank degradation, and urban growth pressures are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the Chesapeake Bay Program, the Mid-Atlantic Highlands Assessment (MAHA), the Mid-Atlantic Integrated Assessment (MAIA), the Atlantic Coastal Plain Aquifer System Project, the Environmental Monitoring and Assessment Program (EMAP) Mid-Atlantic Highlands Stream Assessment, and the Chesapeake Bay/MAIA/MAHA Landscape-Scale Assessment.

Region III projects in the Inventory at this time include:

Anacostia River, DC, MD
Canaan Valley, WV
Christina River, DE, PA
Clinch Valley Watershed, VA
Delaware Estuary, NJ, DE*
Delaware Inland Bays, DE
Maryland's Atlantic Coastal Bays, MD
Middle Fork River, WV
National Capital Area (NCA) Municipal Solid Waste Initiative, DC, MD, VA
Patuxent River Watershed, MD

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

San Juan Bay

Size and location: Two hundred square kilometers (75 square miles) of land comprise this bay-canal-lagoon system on the northern coast of Puerto Rico, which extends from Punta Vacia Talega on the east to Isla de Cabras on the west.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the Program.

Organization that initiated project:

The Puerto Rico Environmental Quality Board

Major environmental problems:

- Heavy metals
- High levels of arsenic, cadmium, chromium, cyanide, mercury, nickel, thallium, and zinc
- Violations of Puerto Rico water quality standards for copper, lead, mercury, selenium, and zinc
- Contaminated sediments
- High levels of oxygen-depleting nutrient loads
- Low dissolved oxygen levels
- Repeated fish kills
- Pathogens, including coliform
- Floatables from garbage dumping
- Hindered coral growth
- Mangrove destruction
- Nonpermitted dredging activities
- Urban development causing sediment loads
- Herbicides and pesticides
- Sedimentation
- Loss of seagrass beds

Actions taken or proposed: San Juan Estuary was declared an estuary of national significance and added to the National Estuary Program in October 1992. A Comprehensive Conservation and Management Plan (CCMP) that will recommend priority corrective actions to restore and maintain the estuarine resources is being developed for San Juan Estuary.

Stakeholders:

Municipality of Toa Baja
Municipality of Cataho
Municipality of Guaynabo
Municipality of San Juan
Municipality of Carolina
Municipality of Loiza
National Oceanic and Atmospheric Administration
Puerto Rico Aqueduct and Sewers Authority
Puerto Rico Planning Board
Puerto Rico Department of Natural Resources
Puerto Rico Environmental Quality Board
Puerto Rico Planning Board
Puerto Rico Ports Authority
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
University of Puerto Rico Sea Grant Program

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Santurce, Puerto Rico 00909
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Anacostia River

Size and location: The Anacostia River flows from Montgomery and Prince George's Counties in Maryland to the District of Columbia, where it empties into the Potomac River and eventually the Chesapeake Bay.

Nature of EPA involvement: EPA has provided funding and technical assistance for study of the Anacostia River watershed. In the future, EPA will place additional emphasis on enforcement in the watershed.

Organizations that initiated project:

State of Maryland, Montgomery and Prince George's Counties in Maryland, and the District of Columbia

Major environmental problems:

- Nonpoint source runoff
- Storm water problems
- Toxic contamination of sediments
- Loss of natural habitat for fish

Actions taken or proposed: The Anacostia River is a priority for several different organizations. The White House Task Force on Ecosystem Management has included this river among its seven priority areas for study. The Chesapeake Executive Council has designated the Anacostia as one of three Regions of Concern for toxic pollution. EPA has targeted the Anacostia in its fiscal year 1995 budget as one of four priority ecosystems for Ecosystem Management. American Rivers has made the Anacostia River one of its top 10 priorities. The Anacostia Watershed Restoration Committee has outlined six goals, which serve as the strategic framework for the restoration of the Anacostia River.

On July 14, 1994, an agreement on ecosystem management in the Chesapeake Bay was signed between EPA and 25 other federal agencies. Under this agreement the U.S. Army Corps of Engineers is developing a Biennial Federal Workplan that provides a framework for all federal landowners to apply their technical resources to contribute to restoration of the Anacostia River through specific commitments including environmental compliance. One aspect of the agreement is support to the Anacostia River Demonstration Project in conjunction with the Anacostia Watershed Restoration Committee. The intent of the Anacostia River Demonstration Project is to provide an opportunity to apply innovative ecosystem management concept in an urban environment. Planning for this project will begin in fiscal year 1995.

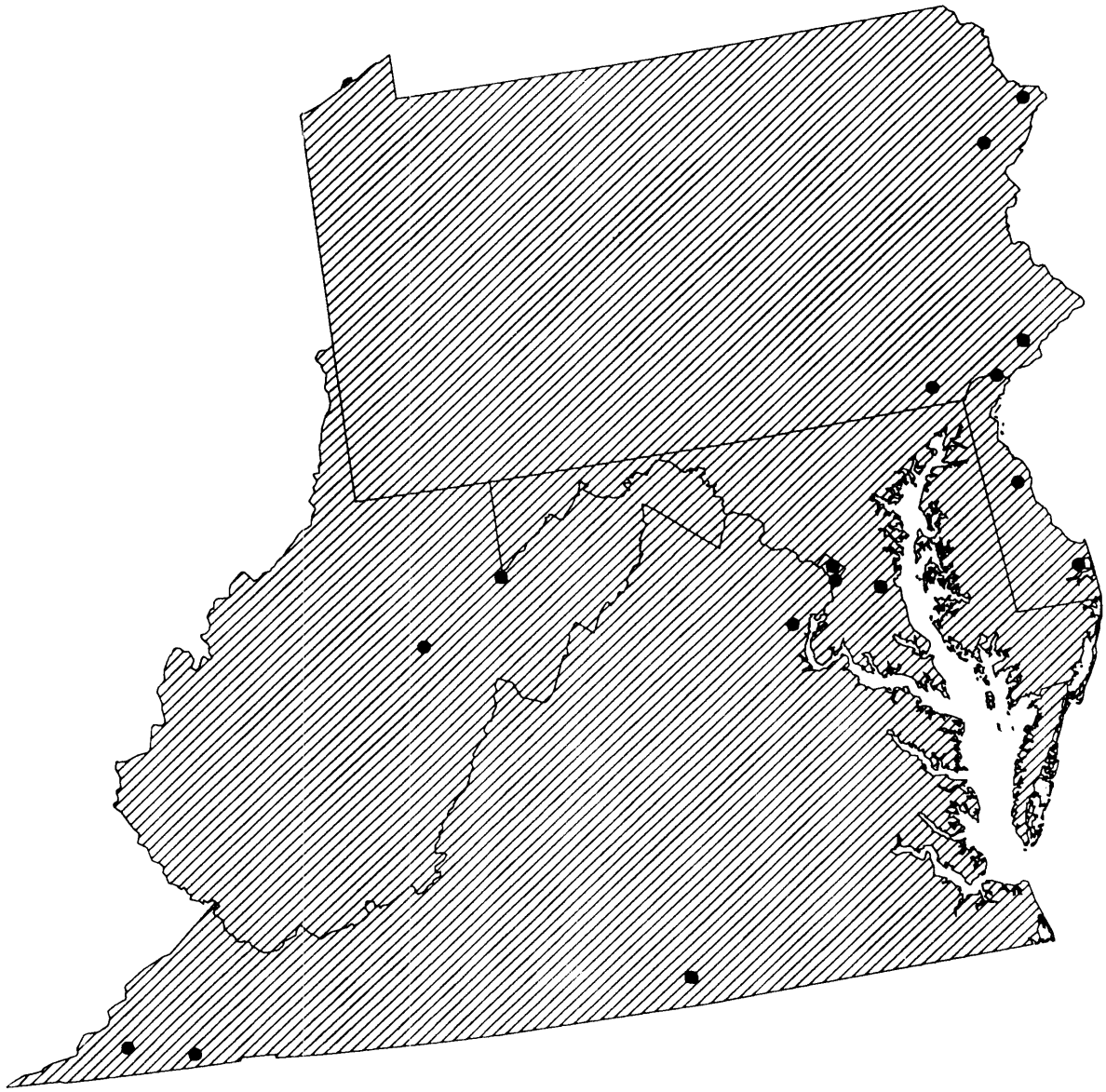
A Chesapeake Bay Regional Action Plan for the Anacostia is under development with EPA financial and technical support. The plan defines goals and strategies for remediation and prevention of toxic pollutants. The plan may include remediation measures for sediment, preventive measures for point/nonpoint sources, and public education. It will be completed in the fall of 1995.

In fiscal year 1994, EPA awarded, through a cooperative agreement, $250,000 to the District of Columbia to conduct toxicological human health and ecological risk assessments for purposes of implementing risk reduction, pollution prevention, and public education and outreach. The objectives of this project are to identify, rank, reduce, and/or prevent pollutants in the impacted communities. EPA expects to provide additional support for this effort in fiscal year 1995.

In fiscal year 1995, EPA will place additional emphasis on enforcement activities in the Anacostia watershed. EPA will identify facilities with significant adverse environmental impacts in the watershed. EPA will schedule inspections at selected facilities and determine environmental compliance. EPA will administer appropriate enforcement response to facilities in violation of environmental regulations. In addition, EPA is revising the National Pollutant Discharge Elimination System permit for the District of Columbia's Blue Plains facility to conform with the National Combined Sewer Overflow Policy.

Other activities include a U.S. Arboretum-led effort to develop a federal tributary strategy for landholders within the District of Columbia by the end of 1995. This tributary strategy will deal with meeting the nutrient reduction goals of the Chesapeake Bay Program in support of the District of Columbia.

Figure 4:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 3 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

● Reference point for local-scale project

State Boundary

Scale 1:4,500,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-3/10
Area boundaries and reference point locations are approximate.

Canaan Valley

Size and location: Canaan Valley covers 142 square kilometers (55 square miles) and is located in Tucker County, West Virginia.

Nature of EPA involvement: EPA is a key player in the Canaan Valley Task Force and also provides funding for various projects and studies in the valley.

Organization that initiated project:
The Canaan Valley Task Force

Major environmental problems: Second-home development and off-road vehicle (ORV) use threaten sensitive wetlands.

Actions taken or proposed: EPA created the Canaan Valley Task Force in July 1990. The Task Force is a public, private, and government partnership formed to ensure long-term environmental protection while allowing for reasonable and sustainable economic growth. The Task Force facilitates open and regular dialogue among all the interests in the valley. The Canaan Valley Task Force coalesces diverse, often competing interests into a working federal, state, local, and public partnership to address a comprehensive range of issues. The dialogue facilitates the resolution of controversial and sensitive issues of habitat protection, economic growth, and property rights.

The following actions have been taken or are under way:

- A land-use trends analysis through geographic information system applications.
- Advance identification of wetlands.
- Suspension of Nationwide Permits for surface mining, minor road crossings, and headwater and isolated wetlands.
- Increased wetlands surveillance and enforcement.
- Vigorous public outreach including numerous open public meetings and development of fact sheets and an informational brochure.
- A wastewater assimilation study of the Blackwater River.
- Two-year assistance to Tucker County for nontraditional means of wastewater treatment.
- Studies of impacts from ORVs involving water quality and vegetative communities.
- A study of the economic impact of the proposed Canaan Valley National Wildlife Refuge.
- An assessment of the headwater wetlands of the valley.
- A U.S. Geological Survey (USGS) ground water study and development of a conceptual ground water flow model.
- A USGS surface water study and development of a surface water model.

Due in large part to the activities of the Task Force, the Monongahela Power Company, the largest landowner in the northern half of the valley where most of the sensitive wetlands are located, has prohibited the use of ORVs on its property, thereby reducing impacts on the wetlands ecosystem from this activity. The Task Force has also helped in the creation of the Canaan Valley National Wildlife Refuge. The first refuge acquisition was formally dedicated on October 22, 1994, as the Nation's 500th National Wildlife Refuge. As more sensitive habitat is acquired for the refuge, the integrity of the wetlands ecosystem will be enhanced.

Stakeholders:
Brooks Bird Club
Canaan Valley Landowners Association
League of Women Voters
Local Citizens Groups
Local citizens
Motorcycle Industry Council
National Audubon Society
National Park Service
National Wildlife Federation
The Nature Conservancy
Timberline Council
Trout Unlimited
Tucker County Chamber of Commerce
Tucker County Citizens for Progress
Tucker County Commission

Pequea and Mill Creeks, PA
Philadelphia Municipal Solid Waste Initiative, PA
Pocono Habitat Demonstration Project, PA
Prince William County Ecosystem Project, VA
Silver Lake, DE
Tri-State Initiative, KY, OH, WV*
Upper Tennessee River Basin, VA
Virginia Eastern Shore Coastal Waters, VA

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Christina River

Size and location: The Christina River watershed encompasses more than 2590 square kilometers (1000 square miles) and drains portions of southeastern Pennsylvania, Delaware, and a small portion of Maryland. The watershed lies within the Delaware River basin.

Nature of EPA involvement: EPA is a member of the management committee, the monitoring and modeling workgroup, and the nonpoint source workgroup. EPA is providing technical assistance as well as financial assistance through various types of grants.

Organizations that initiated project:

Delaware Department of Natural Resources and Environmental Control
Pennsylvania Department of Environmental Resources

Major environmental problems:

- Nutrient problems caused by point and nonpoint sources
- Toxic pollutants
- Threats to water supplies, major recreational areas, and aquatic life from urban and agricultural runoff as well as major point sources, including several hazardous waste sites

Actions taken or proposed: Through a coordinated effort by Pennsylvania and Delaware, this area is in the first stages of developing a total maximum daily load (TMDL). Problems have been identified, and proposed short- and long-term monitoring strategies have been developed. The monitoring plan and proposed future studies for the development of control requirements have been approved by environmental officials in Pennsylvania, Delaware, the Delaware River Basin Commission (DRBC), and EPA. The monitoring program was initiated October 1, 1994.

The approved plan calls for 3 years of monitoring in order to develop sufficient data to calibrate and verify the Water Quality Analysis Simulation Program water quality model. The last 2 years of the plan will be devoted to the development of low-flow TMDLs and control needs.

The states, DRBC, and EPA have begun to factor in the nonpoint source problems in the basin. An interstate nonpoint source workgroup that will develop a workplan to address these problems has been established. This workplan will factor in, as much as possible, the ongoing monitoring activities described above. The receiving stream model noted above will be used to develop TMDLs and control needs for the problem areas within the basin.

In addition, the states have initiated a ground water study for a portion of the watershed—the Red Clay Creek watershed (between Pennsylvania and Delaware). Studies of ground water quality and quantity were conducted by the U.S. Geological Survey (ground water supplies 70 to 80 percent of base flow year-round). The effects of ground water pumping, septic systems, and recharge by wastewater spray irrigation systems were examined. The potential for deep injection of wastewater was also examined and ruled out due to the geology of the basin. The ground water of the Red Clay Creek was found to be generally good, but there are warning signs of potential threats to ground water quality.

Stakeholders:

Brandywine Conservancy
Brandywine Valley Association
Chester County Water Authority
City of Newark
City of Wilmington
Conservation districts
Delaware Nature Society
Delaware Department of Natural Resources and Environmental Control
Delaware River Basin Commission
Natural Resources Conservation Service
New Castle County
Pennsylvania Department of Environmental Resources
Red Clay Valley Association
U.S. Environmental Protection Agency
U.S. Fish and Wildlife
U.S. Geological Survey
White Clay Creek Watershed Association

Anacostia River

Stakeholders:

American Rivers
Anacostia Watershed Restoration Committee
Anacostia Watershed Society
Congresswoman Eleanor Holmes Norton, District of Columbia
Friends of the Anacostia
Georgetown University Law Center and Legal Defense Fund Maryland
Montgomery and Prince George's Counties, Maryland
Washington Council of Governments
Sierra Club
U.S. Army Corps of Engineers
U.S. Department of Agriculture (U.S. Arboretum)
U.S.Environmental Protection Agency
The National Park Service

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Clinch Valley Watershed

Size and location: This project focuses on the Clinch and Powell Rivers, located in southwestern Virginia. Their watersheds cover approximately 9840 square kilometers (3800 square miles).

Nature of EPA involvement: EPA has participated in the project by coordinating a watershed-based ecological risk assessment as a case study of the risk assessment process for broad, watershed-based problems.

Organization that initiated project:

U.S. EPA

Major environmental problems: Several endangered and threatened species of mussels and fish, threatened by:

- Agricultural nonpoint source pollution
- Construction
- Dams
- Mining
- Residential nonpoint source pollution

Actions taken or proposed: EPA is applying the risk assessment methodology to predict potential outcomes and risks of management options and to identify sites in the watershed that are at higher risk of loss and might require protection.

Stakeholders:

Farmers
Mining interests
The Nature Conservancy
Residents
Tennessee Valley Authority
U.S. EPA
U.S. Fish and Wildlife Service

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Tucker County Development Authority
Tucker County Planning Commission
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
West Virginia Audubon Council
West Virginia Chapter of the Sierra Club
West Virginia Division of Environmental Protection
West Virginia Division of Izaak Walton League
West Virginia Division of Natural Resources
West Virginia Division of Tourism and Parks
West Virginia Highlands Conservancy
West Virginia Mountain Bike Association
West Virginia Off-Highway Vehicle Association
West Virginia Recreational Vehicle Association
West Virginia Wildlife Federation

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Private organizations
The States of Delaware, New Jersey, and Pennsylvania
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Christina River

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Delaware Inland Bays

Stakeholders:

Delaware Department of Agriculture
Delaware Department of Natural Resources and Environmental Control
Farmers
Landowners and environmentalists
Local citizens
Resource users (anglers, swimmers, etc.)
Sussex County Council
Sussex Conservation District
Sussex County local governments
Tourist industry
U.S. Department of Agriculture
U.S. Environmental Protection Agency
Various industries

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Delaware Estuary

Size and location: This project focuses on the tidal portion of the Delaware River between the falls at Trenton, New Jersey, and the mouth of the Delaware Bay (between Cape May, New Jersey, and Cape Henlopen, Delaware). The project area, however, encompasses the entire river basin.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding to the Program. EPA (Regions II and III) also provides technical and programmatic support by the commitment of four full-time employees. Additional management and staff support is provided on an as-needed basis.

Organizations that initiated project: The States of Pennsylvania, New Jersey, and Delaware petitioned EPA for inclusion of the Delaware Estuary in the National Estuary Program.

Major environmental problems:

- Toxics in sediments, fish, and birds
- Loss of diversity and loss and fragmentation of certain habitat types
- Nonpoint source pollution
- Water use: supply, quality, and allocation

Actions taken or proposed: The Delaware Estuary was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan is currently being developed for the Delaware Estuary that advocates a watershed protection approach in implementing the action plans. It will provide a basinwide perspective in managing land use, toxics, habitat protection, and water use issues.

One project already under way is the mapping of habitat for priority species throughout the estuary. The maps will be designed for use by local governments to help them protect habitat through improved planning procedures. Land uses and practices appropriate for such areas, coordination of interstate management plans, and inclusion of the important species in Environmental Impact Statements will be proposed. Interstate fish advisories will be coordinated, and loading limits for selected toxicants (total maximum daily loads) will be established. The program will provide technical support for watershed-based land planning for storm water management and nonpoint source control.

The program is also developing a nonpoint source plan that will assist states in prioritizing watersheds, an action plan to address the impacts of toxics on fisheries and raptors, and an action plan for restoration of urban stream corridors. The program is proposing development of a long-term environmental policy plan that would integrate environmental concerns into decision-making by all sectors of society to achieve sustainable development.

Other activities include:

- Examining potential water supply shortages in certain areas of the Delaware basin (such as the Potomac-Raritan-Magothy aquifer system and the Triassic lowland bedrock aquifers) and encouraging protective action by water and wastewater utilities.
- Providing tools and technical assistance to local governments in support of improved land use planning.
- Encouraging and providing incentives for increased regional planning.
- Improving coordination of water supply planning to address water quantity and quality planning.
- Addressing toxics loadings from ground water and nonpoint sources.
- Developing a regional information management service that will facilitate sharing of information.
- Continuing and expanding the ongoing public participation program.
- Coordinating and expanding the monitoring program of the three states.

Stakeholders:

Anglers
Business and industry
Commercial fishing
Environmental groups
Local and regional agencies
Local citizens
National Oceanic and Atmospheric Administration

Middle Fork River

Size and location: The Middle Fork River Watershed encompasses 391 square kilometers (151 square miles) in the hills of central West Virginia.

Nature of EPA involvement: EPA helped to initiate the project, and has provided financial and technical assistance. EPA is also a member of the Middle Fork River Policy Steering Committee.

Organization that initiated project:
U.S. EPA

Major environmental problems: Acid mine drainage from abandoned mines severely impacts drinking water sources, aquatic life including a trout fishery, aesthetics, and recreational activities.

Actions taken or proposed: Critical areas have been defined based on acid loads. A steering committee reviews restoration plans for sites such as anoxic limestone trenches and wetlands. An engineered wetland has been installed. The project has helped generate additional state and federal funds for mine reclamation activities. It has helped the state develop a restoration fund, which will be used on a priority basis for reclaiming mined areas.

Six ground water monitoring stations were installed near Cassity, West Virginia. Two were placed outside the impacted area to collect background data. The sites, which are monitored twice a year, include naturally occurring springs and water. Additional ground water monitoring occurs near Kittle Flats, West Virginia. Ground water seepage is monitored as part of the acid mine drainage control and abatement project in the watershed. The monitoring will help assess the effectiveness of the anoxic limestone drains that are being installed.

Stakeholders:
Recreationalists
USDA Natural Resources Conservation Service
U.S. Environmental Protection Agency
U.S. Office of Surface Mining
West Virginia Division of Energy
West Virginia Division of Natural Resources
West Virginia State Soil Conservation Committee

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Delaware Inland Bays

Size and location: The Delaware Inland Bays Estuary program addresses the water quality and environmental problems of three interconnected watersheds (the Indian River, the Rehoboth, and the Little Assawoman Bays) in Sussex County, Delaware. The drainage area is approximately 775 square kilometers (300 square miles), with a water surface area of 83 square kilometers (32 square miles).

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the program.

Organization that initiated project:

Delaware Department of Natural Resources and Environmental Control

Major environmental problems:

- Habitat loss/modification due to erosion, sedimentation, dredging, and filling
- Eutrophication (nutrient overenrichment)

Actions taken or proposed: The Delaware Inland Bays Estuary was selected for inclusion in the National Estuary Program in 1988. The draft Comprehensive Conservation and Management Plan (CCMP) for the Estuary has been completed and recommends a five-tiered approach to resolving the problems. These efforts include:

(1) A Public Education and Outreach Program, which explains the benefits of the estuary, and the methods of preservation.

(2) An Agricultural Source Action Plan, which proposes management of agricultural wastes and fertilizers.

(3) A Habitat Protection Action Plan, which proposes various methods to control the loss of significant habitat and the preservation of existing aquatic and terrestrial ranges.

(4) An Industrial, Municipal and Septic System Action Plan, which proposes a pollution control strategy and a long term capital expenditure program for wastewater treatment.

(5) A Land Use Action Plan, which evaluates current land-use practices and proposed mitigation measures.

In March 1990 the Inland Bays Recovery Initiative was launched. This 2-year program has been integral to the estuary program. The purpose of the Recovery Initiative was to field-test ideas that could be central to the CCMP. In addition to the Recovery Initiative, Action Plan Demonstration Projects designed to test new techniques were started. Lessons learned from these projects will influence a number of the tactics selected for implementation in the CCMP.

Other activities in the estuary include:

- Preparation of the *Water-Use Activity Impacts Report* in 1989, which will serve as a basis for developing a Water-Use Plan for managing use of the bays' waters.
- Development, by the University of Delaware Sea Grant Marine Advisory Service, of the Inland Bays Citizen Monitoring Program, which is monitoring 30 to 50 sites using more than 50 volunteers.
- Use of a geographic information system to provide topographical and other information useful in planning water and wetland programs and in issuing permits.
- Identification, by the Natural Resources Conservation Service, of areas in which to focus water quality treatment technologies as part of a national Hydrologic Unit Area project. Results will be used to further refine existing agricultural best management practices.
- Assistance to landowners for implementing conservation practices that include building structures for water control and waste management, tree planting, buffer stripping, and managing wetlands. This assistance is provided through the Indian River Watershed Protection Plan.

Patuxent River Watershed

Size and location: Approximately 238,360 hectares (590,000 acres) in Maryland, in the suburban Washington/Baltimore corridor (Montgomery, Howard, Anne Arundel, Prince George's, Charles, Calvert, and St. Mary's Counties), in the watershed of Chesapeake Bay.

Nature of EPA involvement: EPA's Office of Policy, Planning and Evaluation (OPPE) has been funding development of integrated ecosystem and economic models of the watershed for the purpose of policy analysis. The models are designed to be useful in a cost-benefit and sustainability framework. The ecosystem model is a dynamic process-based simulation model that covers the natural ecosystems of the watershed. The model makes predictions about the future condition of the ecosystems of the watershed. These predictions include the type of ecosystem or habitat that will occur in actual geographic locations within the watershed, as well ecosystem process type information such as productivity. The model is based on a spatial grid cell format and also uses geographic information systems (GIS). The economic models are still under development (also in a spatial, GIS framework) and include a model of human land use change (e.g. agricultural to residential, low-density to high-density residential, etc.) and models of agricultural management practices. Feedback loops between the ecosystem and economic models are being developed.

Organization that initiated project:

U.S. EPA, Office of Policy, Planning and Evaluation (OPPE)

Major environmental problems: The models will be designed to evaluate the ecological and economic effects and benefits of various environmental problems. These include agricultural runoff of nutrients, wetland protection and restoration, county level zoning, residential development, watershed sustainability.

Actions taken or proposed: None yet.

Stakeholders:

Interested parties will include OPPE for analysis of benefits of Farm Bill, Chesapeake Bay Program, and EPA's Office of Water

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Maryland's Atlantic Coastal Bays

Size and location: Maryland's Atlantic coastal bays are located on the east coast of the state behind the barrier islands of Assateague and Fenwick. These bays consist of Chincoteague, Newport, Sinepuxent, Isle of Wight, and Assawoman Bays and are within Worcester County, Maryland, extending between the Delaware and Virginia state lines. The bays' watershed encompasses 484 square kilometers (187 square miles).

Nature of EPA involvement: The bays were described in the EPA Region III Near Coastal Waters Strategy as a priority coastal watershed. As a result, the Region has provided grant funds to the state to initiate planning and assessment activities in the watershed.

Organizations that initiated project:

Maryland Department of the Environment—Chesapeake Bay and Watershed Management Administration

Major environmental problems:

- Rapid development causing loss of habitat, increased nonpoint source storm water runoff, and increased nutrient loadings to ground water via septic systems
- Water quality degradation
- Losses of habitat and living resources
- Conflicting land uses
- Excessive anthropogenic pollutant sources
- Loss of wetlands and shallow water habitat from dredging and filling activities
- Closure of shellfishing grounds
- Excessive loadings of fecal coliform bacteria, sediments, and nutrients primarily from nonpoint sources

Actions taken or proposed: A synoptic report that evaluated all relevant scientific studies performed in the coastal bays, identified research needs, provided an annotated bibliography, assessed the principal subbasins responsible for the majority of pollutant loadings, and provided a number of management options to control the pollutant loads entering the bays was prepared by the Maryland Department of the Environment with funding provided by EPA.

A more in-depth evaluation of the bays' watershed performed by the state found that the St. Martins River, the largest tributary to the coastal bays, is experiencing significant water quality degradation from point and nonpoint sources of pollution from excessive loadings of nutrients. In a companion project, the State of Maryland received an additional grant from EPA to apply a nutrient model to the St. Martins River and the upper coastal bays to identify priority subwatersheds that will become the focus for follow-up pollution abatement and control activities.

The Maryland Department of the Environment has completed a report that contains estimated loadings to the bays' ground water by nonpoint sources and will conduct a similar follow-up study that will examine the St. Martins River area.

Stakeholders:

City of Ocean City
National Park Service
State of Maryland
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
Worcester County, MD

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developed within the watershed. The local township officials of the boroughs, LCCD, and PDA are inventorying the existing sources of contamination within these Wellhead Protection Areas and PSC Engineers (consultant for the boroughs) is developing ordinances to protect the pubic wells from contamination.

EPA is currently pursuing a Geographic Information Systems initiative in the Pequea and Mill Creeks watershed.

This watershed is in the top 10 percent of the Pennsylvania nonpoint source priority watersheds, is on the Pennsylvania 303(d) list, and is a priority for the Chesapeake Bay Program, Ground Water Protection Program, and Public Drinking Water Supervision Program.

Stakeholders:

Environmental advocacy groups
Lancaster County Conservation District
Lancaster County Planning Commission
Local farmers
Pennsylvania Agronomic Products Association
Pennsylvania Department of Agriculture
Pennsylvania Department of Environmental Resources
Pennsylvania Fish Commission
Pennsylvania Game Commission
Pennsylvania State Cooperative Extension
U.S. Environmental Protection Agency
U.S. Geological Survey
USDA Farm Service Agency
USDA Natural Resources Conservation Service

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National Capital Area (NCA) Municipal Solid Waste Initiative

Size and location: The NCA project includes Baltimore City and surrounding counties with a total population of 2,399,000; Washington, DC, and the surrounding counties with a population of 3,267,000; and Richmond, Virginia, and the surrounding counties with a population of 893,000. Total population for all three NCA cities and the surrounding counties is 6,559,000.

Nature of EPA involvement: EPA and the Institute for Local Self-Reliance are Partners in a Cooperative Agreement.

Organization that initiated project:
The Institute for Local Self-Reliance (ILSR)

Major environmental problems: The NCA region is estimated to generate over 11,000,000 tons of municipal solid waste per year.

Action taken or proposed: The goal of the project is to stimulate economic development, create new jobs, and launch scrap-based businesses and manufacturing enterprises in Washington, DC, Baltimore, Maryland, and Richmond, Virginia. Secondary materials generated in the cities will be utilized by scrap-based enterprises and manufacturers in the region, diverting wastes from disposal. Scrap-based use of recyclable materials reduces city disposal costs, creates local markets, provides jobs in each of the NCA cities, and increases regional economic activity. The project will also document that diversion of materials from the landfill reduces the amount of greenhouse gasses generated.

Stakeholders:
Baltimore, Maryland
Richmond, Virginia
Washington, DC
U.S. EPA

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Pocono Habitat Demonstration Project

Size and location: The Pocono Project focuses on county-level activities, with additional implementation of actions within several watersheds. These watersheds include the Tobyhanna watershed, which covers 485 square kilometers (187 square miles), and the McMichaels Creek watershed, which covers 293 square kilometers (113 square miles), both located within Monroe County, Pennsylvania.

Nature of EPA involvement: EPA has provided technical assistance, limited funding, facilitation, and coordination.

Organization that initiated project:
U.S. Environmental Protection Agency

Major environmental problem:
Development pressures

Actions taken or proposed: Growth and development in this biologically diverse area threaten to cause degradation and/or loss of valuable upland and wetland ecosystems, which would increase the likelihood for adverse impacts on water quality. This demonstration project is aimed at proactively bringing to the forefront issues related to growth and development that might pose threats before further alteration of the landscape jeopardizes the future of the area as a viable recreational and biologically rich region.

Planning actions that have taken place include:

- Establishment of an Advisory Group and Steering Committee of local stakeholders.
- Development of a project proposal and workplan.
- Through consensus, development of a vision statement.
- Identification of goals and objectives.

Several research actions have been completed, including:

- Inventory of biological diversity as described by the U.S. Fish and Wildlife Service Gap Analysis process (Cornell University and New York Fish and Wildlife Cooperative Research Unit).
- Evaluation of different conservation/-development options for Monroe County (Harvard University).

Additional research actions are currently taking place, including:

- Collection and integration of data layers on a geographic information system.
- Assessment of risks to biodiversity (EPA - Corvallis Laboratory).

Ongoing activities include:

- Implementation of goal to identify landscape linkages/ecosystem mosaics with input to Monroe County Comprehensive Plan.
- Workshops for developers on open space design.
- Outreach to specific developers and township officials.
- Establishment of stream reference sites for biological monitoring.

Stakeholders:
Brodhead Watershed Association
Economic Development Council of Northeast Pennsylvania
Monroe County Conservation District
Monroe County Planning Commission
Penn State Extension
Pennsylvania Department of Natural Resources
Pennsylvania Game Commission
Pocono Mountains Chamber of Commerce
Pocono Mountains Vacation Bureau
Pocono Plan Alliance
State and private forestry
Tobyhanna Watershed Association
Township officials
U.S. Environmental Protection Agency
U.S. Forest Service

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Pequea and Mill Creeks

Size and location: The Pequea and Mill Creeks watersheds are located in southeastern Pennsylvania in Lancaster and Chester Counties. The watersheds total 54,540 hectares (135,000 acres). Land use in the watershed is predominantly agricultural; 63 percent of the land is devoted to cropland and 13 percent to pasture.

Nature of EPA involvement: EPA has provided financial and technical assistance.

Organization that initiated project:
U.S. Geological Survey (USGS)

Major environmental problems:

- Agricultural runoff
- Stream bank erosion
- Nutrient enrichment
- Pesticide contamination

Actions taken or proposed: Surface water in the Pequea and Mill Creeks is used for drinking, irrigation, boating, fishing, water sports, watering livestock, wildlife habitat, and industry. Four tributaries are protected as trout-stocked fisheries, seven areas as cold-water fisheries, and five areas as high-quality cold-water fisheries. Ground water resources of the Pequea and Mill Creeks watershed are the primary source of private and public drinking water, livestock water, and barn/milkhouse water. According to the Pennsylvania Department of Environmental Resources (PaDER), 93.6 stream kilometers (58.5 stream miles) within the watershed have been degraded by agricultural nonpoint sources of pollution.

This initiative will implement a comprehensive surface and ground water watershed program including the establishment of total maximum daily loads for the Pequea and Mill Creek basins in Lancaster County, Pennsylvania.

State and local coordinating committees have been formed to implement a comprehensive watershed initiative. These committees have been met regularly for several years. The U.S. Department of Agriculture (USDA), EPA, U.S Geological Survey (USGS), PaDER, the Pennsylvania Department of Agriculture (PDA), the Lancaster County Conservation District (LCCD), several private consultants, and the Pennsylvania Fish and Game Commission are all members of these committees.

The Pequea and Mill Creeks watershed was chosen as a Hydrologic Unit Area by the U.S. Department of Agriculture (USDA) in February 1991. Under this designation, USDA provides technical and financial assistance to farmers in the watershed for the implementation of best management practices. USDA has provided assistance to farmers in the watershed over the past 3 years, with the goals of significantly reducing nutrient, bacteria, and pesticide contamination to surface and ground waters and controlling sedimentation from runoff and erosion.

In addition, the Pequea-Mill watershed is being used in a cooperative computer modeling effort among the PaDER-Bureau of Land and Water Conservation, Penn State University, and Natural Resources Conservation Service state offices in Pennsylvania and Massachusetts. Data from the watershed will be used in the development of the National Agricultural Pesticide Risk Assessment.

USGS is conducting a number of studies. A ground water survey was initiated in 1991. USGS began a watershed-wide baseline Water Quality Characterization Project in July 1992. The purpose of this long-term study is to document changes in surface water quality for storm and base flow conditions in three watersheds within the Pequea-Mill project area, qualitatively link the water quality changes to agricultural practices and land use changes, and determine water quality changes due to increased livestock production by comparing the data to water quality data collected in the basin in earlier years.

The Pennsylvania Fish and Boat Commission is conducting a biological assessment in the Muddy Run basin. The purpose of the study is to compare existing fish and benthic macroinvertebrate populations to populations after implementation of stream fencing for livestock exclusion and other conservation practices. Data for the preproject condition were collected in 1991. A follow-up assessment will be conducted in 1996.

A Wellhead Protection project for two public water supply wellfields is also being

Silver Lake

Size and location: Silver Lake is located just north of downtown Dover, Delaware. The surface area of the lake is 67 hectares (167 acres), and the lake drains approximately 7700 hectares (19,000 acres).

Nature of EPA involvement: EPA has provided financial and technical assistance.

Organization that initiated project:

Delaware Department of Natural Resources and Environmental Control

Major environmental problems: Algal blooms and bacterial contamination due to agricultural and urban runoff

Actions taken or proposed: Delaware received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Silver Lake and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

In 1990, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work, as well as critical watershed management activities, to control nonpoint source pollution to a lake. A seven-part plan has been initiated by the participating stakeholders, and the project is coordinated by the Delaware Department of Natural Resources and Environmental Control. The plan includes:

- Development of a nature preserve.
- Modification of lake use for bank stabilization.
- Working with property owners to install vegetative cover, riprap, etc. for shoreline erosion control.
- Retrofit storm water control ponds entering Silver Lake to include water quality enhancements.
- Enforcement of construction runoff regulations.
- Installation of agricultural best management practices.
- Public education.
- Follow-up monitoring.

Storm water detention basins will be modified to reduce sediment and phosphorus loadings into the lake. Citizen volunteers have placed fish attraction structures in the lake.

Stakeholders:

Area farmers
Area merchants
City of Dover
Delaware Department of Natural Resources and Environmental Control
Kent County Conservation District
Lake users
Natural Resources Conservation Service

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Philadelphia Municipal Solid Waste Initiative

Size and location: The City of Philadelphia, with a population of 1.7 million, is one of six U.S. cities with a population of over 1 million people.

Nature of EPA involvement: EPA and the City of Philadelphia are Partners in a Cooperative Agreement.

Organization that initiated the project:
The City of Philadelphia, Pennsylvania

Major environmental problems: The City of Philadelphia estimates that 173,623 metric tons (190,985 tons) of municipal solid waste were generated in the last year.

Action taken or proposed: The goal of the project is to divert much of the city's municipal solid waste from landfilling to extend landfill life. Another goal of the project is to attract manufacturers and processors to utilize the secondary materials generated in the city. This will create new jobs and ancillary businesses, causing economic growth for the entire city.

Stakeholders:
Philadelphia
U.S. EPA

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Upper Tennessee River Basin

Size and location: The Upper Tennessee River basin contains the Clinch, Powell, and Holston River basins in southwest Virginia.

Nature of EPA involvement: EPA participates in a Nature Conservancy-led working group and has provided funding for an interagency agreement and Clean Water Act section 104(b)(3) and section 319 grants for watershed restoration.

Organization that initiated project:

The Nature Conservancy

Major environmental problems:

- Treated and untreated point sources (untreated point sources are the more significant problem)
- Nonpoint sources from agriculture, urban runoff, and coal mining
- Threats to habitat of endangered species

Actions taken or proposed: The Nature Conservancy launched its Clinch Valley Bioreserve in 1988 and brought other stakeholders together to plan restoration and protection activities. The Virginia Division of Soil and Water has adopted many subwatersheds as high priorities for nonpoint source pollution controls. The Virginia Department of Environmental Quality placed a ban on halogen-based sewage treatment systems in endangered species waters. More stringent water quality standards have also been adopted for other pollutants. The Nature Conservancy has completed a 5-year strategic plan for the watershed.

Caves, fissures, sinkholes, sinking streams, and underground streams in this limestone karst area serve as direct recharge areas to ground water. Nonpoint source impacts to the ground water from poor agricultural and land-use practices are being addressed through the implementation of appropriate best management practices (BMPs). To prevent cattle from reaching the streams and to buffer the nonpoint source loading from fields, alternative drinking water sources for cattle, fencing, buffer strips adjacent to sinkholes and cave entrances, rotational grazing, and permanent vegetation cover on critically eroded sites will be installed. Conservation planning, septic tank installation, and the removal of trash will also occur. Hydrogeologic studies will be conducted to define, to the extent practical, ground water drainage patterns and spring discharge sites for future karst BMP implementation. Surface water monitoring will occur.

Stakeholders:

Local governments
The Nature Conservancy
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Virginia Department of Environmental Quality
Virginia Division of Soil and Water Conservation
Virginia Polytechnic Institute and State University

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Prince William County Ecosystem Project

Size and location: Prince William County is located in northern Virginia, southwest of Washington, DC.

Nature of EPA involvement: EPA has provided funding (approximately $100,000 to date), has participated in the Project Steering Committee, and is an NNEMS Fellow.

Major environmental problems: Urban growth, increased impervious surface, and associated environmental degradation. The county's population grew more than 40 percent during the 1980s. Now at 1/4 million residents, the county continues to exhibit steady growth.

Organization that initiated project:

EPA in cooperation with the county government

Actions taken or proposed:

- Pollution prevention
- Watershed resource inventories
- Protection and restoration of wetlands and stream resources
- Implementation of innovative stormwater best management practices (BMPs)
- Watershed Management Plan
- Monitoring

Stakeholders:

5 federal agencies
5 state agencies
3 local agencies
2 universities
Local citizens

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Tri-State Initiative

Size and location: Covering 600,000 hectares (1.5 million acres) and including 368,000 people, the Tri-State Initiative is located where the states of Ohio, West Virginia and Kentucky meet and includes the counties of Boyd and Greenup (Kentucky), Lawrence and Scioto (Ohio), and Wayne and Cabell (West Virginia).

Nature of EPA involvement: To assist in a collective effort to define, remediate, and prevent environmental threats in the tri-state area.

Organization that initiated the project:
U.S. EPA

Major environmental problems: This area was selected because of the following high risk/priority indicators: pollutants released into the environment; known/suspected environmental problems; local meteorological conditions; and the level of public concern expressed to EPA.

Actions taken or proposed: The Air Quality, Risk Analysis, Pollution Prevention, Geographic Information System (GIS), and Public Relations workgroups are currently working on the following projects: Industry and Community Discussions, Risk Screening/GIS Mapping, Air Toxics Study, Pollution Prevention, and a Surface Water Study. Teams on the inactive status include Groundwater, Waste, and Compliance.

Stakeholders:
- Agency for Toxic Substances and Disease Registry
- EPA Regions III, IV and V
- Kentucky Department of Environmental Protection
- Kentucky Partners
- Ohio Environmental Protection Agency
- Ohio River Valley Sanitation Commission
- Portsmouth Local Air Quality Agency
- West Virginia Division of Environmental Protection

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Region IV Projects

Example projects submitted by Region IV include the 33 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary considerably in size, in the types of ecosystems considered, in the type of partners involved with EPA, and in their goals. The projects submitted range from research projects assessing ecological risks at a specific site to established watershed projects such as the Savannah River and Flint Creek projects. Many are based on large river basins, small- to moderate-size streams, wetlands Advance Identification areas, and several bayous, bays, and estuaries. Other projects involve waste sites and ecological monitoring, assessment, and research sites.

The Savannah and Flint Creek projects were selected as Watershed Protection Approach (WPA) projects and follow the principles of the WPA, such as involving stakeholders, addressing a broad array of environmental problems, and applying integrated solutions in priority areas. For example, the Savannah River watershed is a very large, interstate river basin encompassing over 10,000 square miles. The Region is currently seeking the issues that are most important to the stakeholders within the watershed. Solutions to these issues will be developed by using the authorities, expertise, and resources of the stakeholders.

Agricultural runoff, eutrophication, water flow alteration, wetland loss or degradation, sedimentation, aquatic and terrestrial habitat loss or degradation, threats to sensitive areas, declines in fisheries, toxics and heavy metals, pathogens, contaminated sediments, industrial wastes, urban runoff, hypoxia, industrial discharges, seagrass die-off, forestry nonpoint source impacts, and airborne pollutants are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans.

Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the Southern Appalachian Man and the Biosphere (SAMAB) Initiative, the Southern Appalachian Mountains Initiative, the SAMAB Landscape-Scale Assessment, the Gulf of Mexico Program, the South Florida Ecosystem Initiative, and the Lower Mississippi Delta Initiative, as well as parts of the Mid-Atlantic Integrated Assessment (MAIA).

Virginia Eastern Shore Coastal Waters

Size and location: A portion of the Virginia eastern shore coastal waters lies within The Nature Conservancy's Virginia Coast Reserve. The Reserve encompasses 162 square kilometers (62.5 square miles); includes 14 barrier islands, tidal marshes, and waterfront mainland sites; and extends along the Atlantic coast of Virginia's eastern shore.

Nature of EPA involvement: The Virginia eastern shore coastal waters were described in the EPA Region III Near Coastal Waters Strategy as a priority coastal watershed. As a result, the Region has provided grant funds to assist The Nature Conservancy in developing conservation plans to protect the nearshore waters from pollution related to land use practices.

Organization that initiated project:

The Nature Conservancy - Virginia Coast Reserve

Major environmental problems:

- Development pressures
- Nonpoint source pollution from farms
- Failed septic tanks
- Point source loadings from seafood processing plants

Actions taken or proposed: Under an EPA grant, The Nature Conservancy has begun work with a local landowner and a multidisciplinary group of university researchers to develop and implement a model protection initiative for farmland that encompasses several subwatersheds to Hog Island Bay. The initiative has prioritized the threats to the subwatersheds via an ecological risk assessment and is working with the landowner and local officials to develop model land use plans and a model conservation easement. This model conservation easement can then be used to protect seaside farmlands that are at risk from ecologically unsound development.

As a complement to the farmland conservation easement initiative, The Nature Conservancy, with the assistance of an EPA grant, is undertaking a model waterfront village protection initiative to address key threats associated with development of Virginia Eastern Shore seaside towns and villages. The Conservancy plans to develop a sustainable development plan and implement a model protection initiative at Willis Wharf, one of five waterfront towns and villages on the Eastern Shore's seaside, working in close partnership with the local citizens, businesses, and government.

The Nature Conservancy has also sponsored studies, including the Broadwater Macrosite Model Watershed Protection Initiative of loadings of nutrients to both ground and surface waters at selected sites on the Chesapeake Bay. A citizen-run water monitoring project Water Quality Monitoring Initiative monitors both ground and surface water in the watershed.

Stakeholders:

Accomack-Northampton Planning District Commission
Citizens for a Better Eastern Shore
Northampton County Board of Supervisors
The Nature Conservancy
Town of Exmore
U.S. Environmental Protection Agency
Water Quality Consortium
Working Watermens Association

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ACF/ACT Comprehensive Study

Size and location: The Apalachicola/Chattahoochee/Flint River basins and Alabama/Coosa /Tallapoosa River basins (ACF/ACT) comprehensive study encompasses six major river basins in the States of Alabama, Georgia, and Florida.

Nature of EPA involvement: EPA is involved in an advisory capacity on the overall management coordination committee and is an active participant in the Water Quality Taskforce, along with providing monitoring and assessment assistance.

Organization that initiated project: The Mobile District of the U.S. Army Corps of Engineers (COE) and the States of Alabama, Georgia, and Florida are cooperative partners in this effort to resolve the present and future water quality and quantity problems and to develop a management plan to best use the waters for the overall benefit of all parties.

Major environmental problems: The major environmental problems being addressed are eutrophication due to point and nonpoint source nutrient loadings to the reservoirs, water flow requirements for aquatic habitat, protection of the fisheries, protection of the environmentally sensitive Apalachicola Bay system, assurance of safe drinking water, and others.

Actions taken or proposed: Alternative management strategies will be developed to evaluate the impacts of increased treatment for point source discharges and alternative flow release options from the many COE and other power generation dams.

Stakeholders:

Alabama
Army COE
Florida
Georgia
Local governments
U.S. EPA
U.S. Fish and Wildlife Service
U.S. Geological Survey

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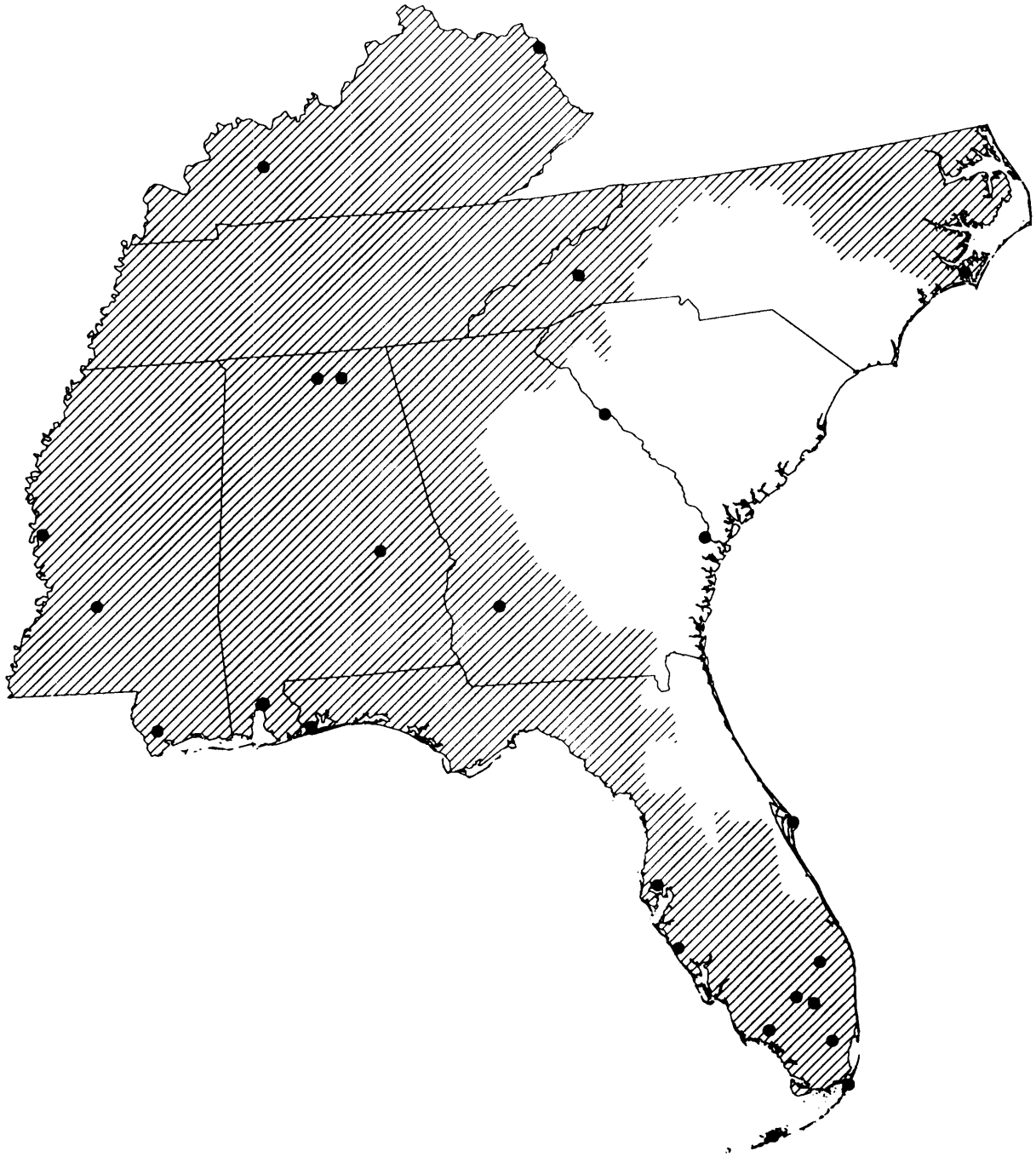
Figure 5:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 4 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale project

State Boundary

Scale 1:8,750,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-4/10
Area boundaries and reference point locations are approximate.

Back Bay of Biloxi Ecosystem Assessment

Size and location: The Back Bay of Biloxi, covering 8 square kilometers, borders Harrison, Stone, and Jackson Counties, Mississippi.

Nature of EPA involvement: EPA Region IV provided funding of $250,000 to document water quality and determine effects of pollution sources on ecosystem health. The Gulf of Mexico Program contributed $75,000 for chemistry analyses. EPA's Gulf Breeze Environmental Research Lab and EMAP-Louisianian Province contributed equipment and time to aid in characterization of the bay.

Organizations that initiated project:

Mississippi Department of Environmental Quality, Jackson, MS
Gulf Coast Research Lab, University of Southern Mississippi, Ocean Springs, MS

Major environmental problems:

- Low dissolved oxygen
- High bacteria and nutrient levels
- 33 industrial facilities (seafood processors, shipyards, marinas, petroleum facilities, and metal processing and chemical industries)

Actions taken or proposed: The research project ("Ecosystem Health Demonstration Project: Near-Shore Gulf of Mexico") is still ongoing and includes not only ecological parameters but also human pathogens. The Environmental Monitoring and Assessment Program (EMAP) design, with more intensive sampling, is being used along with selected biomarkers. The research is part of an overall program to develop a set of ecological assessment procedures to describe the condition of Gulf Coast estuaries, to identify and characterize ecological problems caused by contaminants, and to determine the causes of observed problems.

Stakeholders:

Food and Drug Administration
Mississippi Bureau of Marine Resources
Mississippi Department of Environmental Quality
U.S. EPA EMAP-Louisianian Province
U.S. EPA Gulf of Mexico Program
U.S. EPA Region IV

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Region IV projects in the Inventory at this time include:

ACF/ACT Comprehensive Study, AL, FL, GA
Albemarle-Pamlico Sound, NC
Back Bay of Biloxi Ecosystem Assessment, MS
Bayou Chico Ecological Assessment, FL
Bayou Grande Ecological Assessment, FL
Bayou Texar Ecological Assessment, FL
Cahaba River Basin Project, AL
Carteret County Wetlands Advance Identification (ADID) Project, NC
Central Dougherty Plain Wetlands Advance Identification (ADID) Project, GA
Charleston Harbor Project, SC
Escambia River Watershed Project, FL
Flint Creek, AL
Florida Bay Algal Bloom Monitoring Project, FL
Florida Everglades Mercury Ecological Risk Assessment, FL
Florida Keys National Marine Sanctuary, FL
Florida Keys Wetlands Advance Identification (ADID) Project, FL
Huntsville Wetlands Advance Identification (ADID) Project, AL
Indian River Lagoon, FL
Land-of-Sky Municipal Solid Waste Initiative, NC
Lower Mississippi Alluvial Valley Wetland Conservation Plan, IL, LA, MS, AR, KY, TN, MO*
Loxahatchee River Basin Wetland Planning Project, FL
Mobile Bay Restoration Demonstrations, AL
Pearl River Wetlands Advance Identification (ADID) Project, MS
Pensacola Bay Watershed Evaluation, FL
Rookery Bay Wetlands Advance Identification (ADID) Project, FL
Sarasota Bay, FL
Savannah River Basin, FL, GA, SC
South Florida Wetlands Permitting and Mitigation Strategy, FL
Tampa Bay, FL
Tri-State Initiative, KY, OH, WV*
Weeks Bay Estuarine Research Project, AL
West Broward County Wetlands Advance Identification (ADID) Project, FL
West Chatham County Wetlands Advance Identification (ADID) Project, GA
West Kentucky Coalfield Wetlands Advance Identification (ADID) Project, KY

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Bayou Grande Ecological Assessment

Size and location: Escambia County, Florida. Bayou Grande is 4.3 square kilometers.

Nature of EPA involvement: Multi-year ecological evaluation to determine ecological status, sensitive ecological assessment techniques, and risk assessment methodology.

Organization that initiated project:

U.S. EPA, Environmental Research Lab - Gulf Breeze, FL

Major environmental problems: Toxic contamination of sediments due to Superfund site on naval base.

Actions taken or proposed: Ground water monitoring

Stakeholders:

City of Pensacola
Florida Department of Environmental Protection
U.S. EPA Region IV
U.S. Navy

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Albemarle-Pamlico Sound

Size and location: The Albemarle-Pamlico Estuary is composed of seven sounds with several rivers, which in turn drain more than 77,700 square kilometers (30,000 square miles) of land. A total of 36 counties in northeastern North Carolina and all or part of 19 counties and independent cities in southeastern Virginia compose the watershed.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the Program.

Organization that initiated project:
State of North Carolina

Major environmental problems:
- Declines in fishery productivity
- Impaired health of aquatic resources
- Impairment of nursery area function
- Eutrophication and sedimentation
- Fish kills
- Habitat loss
- Shellfish closures
- Toxic contamination

Actions taken or proposed: The Albemarle-Pamlico Estuary was selected for inclusion in the National Estuary Program by EPA in 1987. A Comprehensive Conservation and Management Plan (CCMP) that recommends priority corrective actions to restore and maintain the estuarine resources was officially accepted by the Governor of North Carolina and EPA in November 1994. The Albemarle-Pamlico Estuarine Study Management Conference proposes to coordinate implementation of the CCMP through a Coordinating Council and five regional councils organized within watersheds. The CCMP calls upon local governments and citizens to protect the estuary through stronger state and local land use policies, land stewardship, best management practices, and public education. The CCMP stresses:

- Voluntary programs with strong incentives for implementing the various recommendations in the CCMP.
- Land and water use plans.
- Improved wetland and habitat protection.

During development of the CCMP, several demonstration projects were undertaken to show the viability of final recommendations for restoration of the estuary. These demonstration projects included habitat restoration, storm water management, animal waste management, and fishery by-catch reduction.

Stakeholders:
Businesses
Commercial fishing
Farmers
General public
Recreational users, including anglers and boaters

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Cahaba River Basin Project

Size and location: The Cahaba River is approximately 306 kilometers (190 miles) long from its headwaters in St. Clair County, Alabama, to its confluence with the Alabama River in Dallas County. It drains an area of approximately 4725 kilometers (1825 square miles).

Nature of EPA involvement: EPA will provide assistance to the Alabama Department of Environmental Management (ADEM) in developing a basin management plan for activities that will address the aquatic resource problems and protect human health.

Organization that Initiated Project:
U.S. EPA

Major environmental problems: Problems identified include low dissolved oxygen levels below point source discharges, increased chemical concentrations (ammonia, nutrients, and chlorine) due to low streamflow, eutrophication and resulting algal blooms, habitat degradation due to sediments and eutrophication, high bacteria levels inhibiting recreational activities, toxics such as metals, insecticides, and herbicides, fisheries health and diversity problems, and water quality problems due to hydromodification.

Actions proposed: The basin management plan will involve (1) the identification of basin problems/critical issues and available data; (2) the appropriate sampling, analysis, and planning to identify and prioritize the problems/critical issues; (3) the identification of management strategies for addressing the basin problems and the integrated solutions; (4) the implementation of the management plan and the solutions identified; and (5) the follow-up monitoring program to determine the effectiveness of the implementation plan.

Stakeholders: Full stakeholder involvement is anticipated throughout the process. Stakeholders include EPA, ADEM, Jefferson County, Shelby County, St. Clair County Dallas County, Perry County, Bibb County, Cahaba River Society, U.S. Fish and Wildlife of Alabama, Jefferson County Health Department, Sierra Club, Alabama Conservancy, Birmingham Audubon, Alabama Attorney General's Office, Geological Survey of Alabama, Alabama Department of Economic and Community Affairs, affected municipalities/industries.

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Bayou Chico Ecological Assessment

Size and location: Escambia County, Florida. Bayou Chico is 0.8 square kilometer.

Nature of EPA involvement: Cooperative agreement with North Texas State University to conduct an ecological evaluation and to determine sensitive assessment techniques and risk assessment methodology. Intramural research consists of multiyear ecological evaluation.

Organization that initiated project:

U.S. EPA, Environmental Research Lab - Gulf Breeze, FL

Major environmental problems: Nutrient enrichment and contaminated sediment caused by urban runoff and extensive industrial activities.

Actions taken or proposed: None to date.

Stakeholders:

City of Pensacola
Florida Department of Environmental Protection
Florida Northwest Water Management District
U.S. EPA Region IV

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Central Dougherty Plain Wetlands Advance Identification (ADID) Project

Size and location: 161,600 hectares (400,000 acres) around Albany, Georgia (Baker, Calhoun, Dougherty, Lee and Terrell Counties).

Nature of EPA involvement: EPA is coordinating this multiagency planning effort and providing major funding through a cooperative agreement with the Georgia Department of Natural Resources. EPA also provided funds to the U.S. Geological Survey and the U.S. Fish and Wildlife Service for assistance on this project.

Organization that initiated project: EPA initiated this project in cooperation with the U.S. Army Corps of Engineers in response to concerns over unpermitted filling activities in the area, which contains extensive bottomland hardwoods and limesink wetlands.

Major environmental problems: Urban growth, silvicultural conversion, and agricultural activities threaten bottomland hardwood and limesink wetlands in the Albany area. Water quality and quantity are prime concerns due to the karst terrain with complex surface and ground water interconnections. The area lies distant from any regulatory agency offices, and unpermitted filling of wetlands has occurred.

Actions taken or proposed: A multiagency project team, including representatives from federal and state government, as well as technical advisors from local government and academia, is developing a geographic information system (GIS) database with information on project area wetland types, soils, geologic characteristics, landscape positions, and functional assessment field scores. Limited field testing is being conducted to fill data gaps in wildlife usage of the area. Maps and a technical document will be produced designating the suitability of project area wetlands for filling based on the functions provided by the wetlands. These products will be available to government agencies and the general public for use in preliminary planning for project area wetlands. Citizens are being educated about local wetlands through public meetings, informational mailings, television appearances by project team members, and development and distribution of a wetlands brochure.

Stakeholders:

Government agencies that regulate natural resources, landowners, land developers, environmental groups, environmental consultants, real estate agents, farmers, foresters and hunters.

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Bayou Texar Ecological Assessment

Size and location: Escambia County, Florida. Bayou Texar is 1.4 square kilometers.

Nature of EPA involvement: Multi-year ecological evaluation to determine ecological status; sensitive ecological monitoring techniques and risk assessment methodology.

Organization that initiated project:

U.S. EPA, Environmental Research Lab - Gulf Breeze, FL

Major environmental problems:

Urban runoff, urban development, and Superfund site contribute to excessive sedimentation, nutrient enrichment, and sediment contamination.

Actions taken or proposed: Dredging

Stakeholders:

City of Pensacola
Florida Department of Environmental Protection
U.S. EPA Region IV

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Escambia River Watershed Project

Size and location: Escambia County, Florida. Escambia Bay is 93 square kilometers. It also has the fifth largest watershed in Florida.

Nature of EPA involvement: Multiyear investigations to assess rare and endangered mussels, determine ecological status, develop sensitive ecological techniques, and develop risk assessment methodology for watersheds.

Organization that initiated project:

U.S. EPA, Environmental Research Lab - Gulf Breeze, FL

Major environmental problems: Many industrial discharges and considerable agricultural runoff have reduced quality of water and sediment.

Actions taken or proposed: None to date.

Stakeholders:

U.S. EPA Region IV
Florida Department of Environmental Protection
Florida Northwest Water Management District

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Carteret County Wetlands Advance Identification (ADID) Project

Site Size and Location: Area encompassed is entirety of Carteret County, on the North Carolina coast.

Nature of EPA involvement: ADID's are EPA-led initiatives in cooperation with state and/or local government or agency. EPA acts to assist the state or local sponsor in gathering scientific data on wetlands in a defined geographic area, and coordinates the project activities of the various agencies involved. EPA also produces the Technical Summary Document describing the project findings and regulatory implications. The data are used by federal government agencies as regulatory guidance under Section 404 of the Clean Water Act, and by the state/local sponsor as they see fit for their own programs as long as they are consistent with federal policy. In this project the NC Division of Coastal Management plans to use results to facilitate development of a state Wetland Conservation Plan, and County can incorporate information into future Land Use Plans.

Organization that initiated project: NC Division of Coastal Management requested that EPA initiate an ADID with their cooperation in Carteret County.

Major environmental problems: Historic wetland loss through agricultural conversion and residential and urban development. Ongoing loss of pocosins, a unique local wetland type. Need for protection of fish and shellfish habitat.

Actions taken or proposed: Project is in final stages. All field data have been gathered and analysis is nearing completion. Carteret County and segments of regulated community are utilizing selected draft designation maps for development planning.

Stakeholders: EPA, Corps, North Carolina Division of Coastal Management, Carteret County. Various other federal and state agencies also interested in results.

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Tennessee Valley Resource Conservation & Development
U.S. Agriculture Stabilization and Conservation Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

Contact:

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Charleston Harbor Project

Size and location: Charleston Harbor is located near and around Charleston, South Carolina. The project areas consist of Charleston estuary and the Ashley, Wando, and Cooper Rivers encompassing 808,000 hectares (2 million acres) of land area.

EPA involvement: The Charleston Harbor Project is based on EPA's National Estuary Program guidance. EPA Region IV has provided both technical and management assistance along with monitoring support.

Organization that initiated project: The Charleston Harbor Project evolved from a grass-roots effort of the concerned citizens in the Charleston area. Their efforts resulted in 1991 funding approval for a special area management plan implemented through the South Carolina Coastal Council and initial funding from the National Oceanic and Atmospheric Administration.

Major environmental problems: Charleston Harbor is an important commercial port and is also a very rich estuary with over 20,000 hectares (50,000 acres) of coastal marshes. The rapid urbanization and consequent nutrient enrichment of the estuary are the most probable causes of future degradation. Also, Charleston Harbor has many water-based industrial and commercial activities that could lead to localized contaminated toxic "hot spots."

Actions taken or proposed: Four major tasks are being undertaken to identify pollution causes and subsequent management strategies: (1) Water Quality Modeling and Nutrient Dynamics Project, (2) Water Quality Management and Best Management Practices Project, (3) Biological Habitat Project and, (4) Land Planning and Cultural Resource Projects.

Stakeholders:

Charleston local government
Industry representatives and water users
National Oceanic and Atmospheric Administration
South Carolina Department of Health and Environmental Conservation
South Carolina Coastal Council
U.S. Army Corps of Engineers
U.S. EPA
U.S. Geological Survey

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Florida Everglades Mercury Ecological Risk Assessment

Size and location: Receptor region is 10,000 square kilometers (about 60 km x 160 km south of Lake Okeechobee to Florida Bay and the Keys). The actual study area for atmospheric mercury fluxes would be larger (regional and global).

Nature of EPA involvement: Development and initiation of a multidisciplinary, multimedia interagency study to address the extensive contamination of Everglades biota with mercury of unknown origin. Comprehensive eco-risk assessment of mercury contamination in water, sediment, and biota (especially fish). Three major candidate stressor areas are agricultural, industrial, and hydroperiod (hydrologic and hydraulic changes).

Organizations initiating project:

U.S. EPA (Region IV and the Office of Research and Development)
U.S. Department of the Interior (National Biological Survey, National Park Service, Fish and Wildlife Service)
Florida International University
Florida Department of Environmental Protection
South Florida Water Management District
Florida Game and Freshwater Fish Commission

For the atmospheric component, EPA's Atmospheric Research and Exposure Assessment Laboratory (AREAL, Region IV), Electric Power Research Institute (EPRI), Environment Canada, Florida Department of Environmental Protection, Florida State University, the University of Michigan, and other representatives from industry.

Major environmental problems: Elevated mercury levels in top carnivores, fish, water, and sediments.

Actions taken or proposed: Development and application of ultra-trace level analytical methods for mercury; implementation of a multimedia biogeochemical cycling study for mercury in the Everglades ecosystem; understanding of the relative contributions of mercury sources (atmospheric emissions from South Florida urban areas, drainage water from agricultural lands, natural Everglades peat mercury pool, etc.) to the Everglades ecosystem and the environmental conditions that result in the bioaccumulation of methylmercury; understanding potential interrelationships between Everglades phosphorus and mercury bioaccumulation; ecological risk assessment model for the Everglades ecosystem; understanding of the appropriateness and effectiveness of potential remediation or regulatory strategies.

EPA's Regional Environmental Monitoring and Assessment Program (REMAP) has provided valuable exposure information. Biogeochemical modeling and connections to atmospheric and water models and monitoring data is needed. The latest atmospheric initiative should address three basic questions:

- What are the sources of mercury to the atmosphere in South Florida (anthropogenic, natural background, and local)?
- What are the spatial and temporal distributions of mercury deposition in South Florida (speciation of deposited mercury; phase separation/distribution of deposited mercury)?
- What are the mechanisms of transformation and source-receptor relationships that help to explain the deposition gradient (fate fluxes, and removal mechanisms, such as washout, evasion, impaction, transformation leading to enhanced removal, explore source-receptor, regional transport modeling)?

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Flint Creek

Size and location: Flint Creek has a 117,000-hectare (290,000-acre) watershed that is located in north-central Alabama and drains to Wheeler Reservoir in the Tennessee River.

Nature of EPA involvement: EPA has participated in the project by providing approximately $1.5 million in section 319 funds, through the Alabama Department of Environmental Management, during FY92-95. EPA has also provided technical support with a part-time project coordinator and staff participation on the four project committees.

Organization that initiated project:

U.S. Environmental Protection Agency
Alabama Department of Environmental Management*
Tennessee Valley Authority*
U.S. Department of Agriculture*

*key players in formation of the project

Major environmental problems:

- Runoff from agricultural lands
- Point source pollutants
- Runoff from urban areas
- Bank-side and in-stream debris and litter

Actions taken or proposed: The Flint Creek Watershed Project was initiated in 1992 with an organizational meeting with stakeholders. Project objectives were determined and resource commitments were obtained at this meeting. Several subsequent meetings of the major stakeholders and subcommittee members have resulted in the following actions:

- Hired a Project Leader.
- Developed watershed maps and an inventory of land uses in the watershed.
- Compiled existing water quality data and collected additional water quality data.
- Conducted two fish health studies and several biological assessments.
- Initiated an Agriculture Stabilization and Conservation Service Water Quality Initiative Project in Crowdabout Creek.
- Developed a volunteer monitoring program.
- Initiated work on development of a total maximum daily load model.
- Developed three outdoor laboratories.
- Formed a watershed Conservancy District and elected 11 directors from the 3-county area.
- Developed a geographic information system for the watershed.
- Approved grants for best management practices to control waste on dairy and swine farms.
- Assisted area farmers with animal waste lagoon pumpout.
- Developed a Self-Enviro-assist program.
- Implemented a sociological survey to assess community attitudes and measure attitude changes over time.
- Developed several educational activities and environmental literature for school and community distribution.

Stakeholders:

Alabama A & M Cooperative Extension Service
Alabama Department of Agriculture and Industries
Alabama Department of Environmental Management
Alabama Department of Public Health
Alabama Forestry Commission
Alabama Geological Survey
Alabama Soil and Water Conservation Committee
Auburn University Cooperative Extension Service
Cullman County Soil & Water Conservation District
Lawrence County Soil & Water Conservation District
Morgan County Litter Control Office
Morgan County Soil & Water Conservation District
Soil Conservation Service
Tennessee Valley Authority

Florida Keys Wetlands Advance Identification (ADID) Project

Size and location: 26,260 hectares (65,000 acres); study area is the Keys archipelago from North Key Largo to Key West.

Nature of EPA involvement: Awarded grants to the local sponsor (Monroe County) and to the Florida Department of Environmental Protection to assist in their participation; funded Interagency Agreements (IAGs) with the Fish and Wildlife Service and National Aeronautics and Space Administration (NASA) for their participation; EPA project officer spends one-third full time serving as coordinator.

Organizations that initiated project:

EPA and U.S. Army Corps of Engineers

Major environmental problems: Cumulative effects of numerous small-scale wetland fills, wetland habitat loss of endangered species

Actions taken or proposed: A geographic information system (GIS) is in place; digital land cover has been acquired; a functional assessment model has been developed; and wetland delineation, classification, and assessment are under way. Project goals are to incorporate ADID findings into the county land use plan; to write a general permit for areas that are suitable for fill; and to coordinate future wetland mitigation banks among federal, state, and local officials. The results of this ADID should be incorporated into federal, state, and local regulatory efforts, as well as local planning processes and PE&O.

Stakeholders:

County/State residents; local developers, property owners, political leaders, and environmental activists; citizens at all levels of government; federal and county regulators; state and county planners

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Florida Bay Algal Bloom Monitoring Project

Size and location: Florida Bay is a lagoonal estuary bordered on the north by the Florida mainland and on the southeast by the Florida Keys. It is approximately 2200 square kilometers. The bay is shallow, with an average depth of 1 meter.

Nature of EPA involvement: Provide image processing support to determine the ability of NALC triplicates to identify algal blooms in the Florida Bay and to discover the earliest possible date of their occurrence. The EPA has funded $75,000 and five people are involved.

Organization that initiated project: EPA Gulf Coast Program Office

Major environmental problems: Algal blooms causing a deterioration in water quality in Florida Bay with major impacts on fisheries-related industries and recreation.

Actions taken or proposed: Phase I of image processing support involved the analysis of an NALC triplicate of the Florida Bay area to determine whether algal blooms could be detected from the images. Initial results (without the benefit of ground truthing) indicated anomalous high near infrared (IR) reflectance, which might indicate the presence of algal blooms. A proposed Phase II would incorporate ground truth data with results obtained from the Phase I effort.

Stakeholders:

Florida Department of Environmental Protection
National Oceanic and Atmospheric Administration
U.S. Environmental Protection Agency

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Indian River Lagoon

Size and location: The Indian River Lagoon (IRL) comprises more than a third of Florida's east coast and extends 250 kilometers (155 miles) from Ponce de Leon Inlet in the north to Jupiter Inlet in the south. The IRL basin spans about 5900 square kilometers (2280 square miles) and includes three major watersheds.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding, and technical and programmatic support and has participated in various committees in the program.

Organizations that initiated project:

Marine Resources Council of East Central Florida
State of Florida
St. Johns River Water Management District

Major environmental problems:

- Isolation of coastal wetlands due to mosquito impoundments
- Storm water runoff
- Undesirable freshwater discharges
- Increased suspended matter loadings and sedimentation
- Increased nutrient loadings
- Population increase resulting in undesirable watershed alterations
- Loss of seagrass beds
- Loss of emergent wetlands
- Lack of consistency in environmental protection rules and criteria

Actions taken or proposed: The IRL was selected for inclusion in the National Estuary Program (NEP) by EPA in 1990. IRL NEP activities have focused on the development of a Comprehensive Conservation and Management Plan (CCMP) to identify and promote the restoration of water quality and resources in the area. Emphasis has been placed on assessing nonpoint sources of runoff, determining environmental requirements needed for submerged aquatic vegetation, reconnecting and acquiring mosquito impoundments, and promotion of IRL stewardship. As part of the development of the CCMP, several demonstration projects are being undertaken to show the viability of final recommendations for restoration of the estuary. These demonstrations include habitat restoration, storm water management, and innovative ecosystem management practices.

Stakeholders:

Businesses
Commercial fishing
Local citizens
Recreational users including diver/snorkelers, boaters, and anglers

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Huntsville Wetlands Advance Identification (ADID) Project

Size and Location: Project area covers 2424 hectares (6000 wetland acres) around Huntsville, Alabama.

Nature of EPA involvement: ADIDs are EPA-led initiatives in cooperation with a state and/or local government or agency. EPA acts to assist the state or local sponsor in gathering scientific data on wetlands in a defined geographic area and coordinates the project activities of the various agencies involved. EPA also produces the Technical Summary Document describing the project findings and regulatory implications. The data are used by federal government agencies as regulatory guidance under section 404 of the Clean Water Act, and by the state/local sponsor as it sees fit for its own programs as long as its uses are consistent with federal policy. In this project the City of Huntsville may use the findings to enact a future wetland ordinance.

Organization that initiated project: The City of Huntsville requested that EPA initiate an ADID with its cooperation in the Huntsville area.

Major environmental problems: Wetland loss through unpermitted filling and wetland degradation from agricultural practices causing erosion and sedimentation are the greatest threats in this area.

Actions taken or proposed: Project is near completion. All data have been gathered and wetlands designated regarding suitability for filling. Approximately 98 percent of wetlands designated unsuitable for development in draft Technical Summary Document. Corps of Engineers considering exertion of discretionary authority over NW 26 permitting in ADID area.

Stakeholders:

Primarily EPA, Corps of Engineers, and City of Huntsville. Also U.S. Fish and Wildlife Service, Madison County, Alabama Department of Environmental Management.

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Lower Mississippi Alluvial Valley Wetland Conservation Plan

Size and location: 1120-kilometer (700-mile) stretch from Cairo, Illinois, south to the Gulf of Mexico; historical alluvial plain of the Mississippi River.

Nature of EPA involvement: Currently, providing funding assistance to multiple state agencies within the Lower Mississippi Valley, as well as federal interagency projects addressing forestry and resource planning issues. EPA and several regional sponsors will be coordinating the development of a regional wetlands conservation plan.

Organization that initiated project: Multiple federal agencies, including EPA, U.S. Geological Survey (USGS), National Biological Survey (NBS), Natural Resources Conservation Service (NRCS) and U.S. Fish and Wildlife Service (FWS) are initiating ecosystem-scale planning and research efforts in the region.

Major environmental problems:

- Nonpoint source pollution in surface waters
- Extensive forested wetlands loss
- Impacted fisheries and wildlife habitats
- Extensive hydrological modifications

Actions taken or proposed: This multistate, multiregion initiative focuses on wetland restoration/reforestation and reduction of nonpoint source water pollution throughout the Lower Mississippi River Alluvial Plain. A regional sponsor will coordinate state and federal efforts by developing and implementing a regional wetlands conservation plan. Establishing networks among interest groups and data sharing through the use of a geographic information system will be emphasized, as well as prioritization of wetland restoration/acquisition sites.

Stakeholders:

Natural resource state agencies from MS, LA, TN, AR, KY, MO, and IL, agricultural community, forestry community, landowners, hunting and outdoor recreation groups, environmental organizations, sustainable economy organizations, federal natural resource and public health agencies, including EPA, National Biological Survey, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, U.S. Geological Service, U.S. Forest Service, Agency for Toxic Substances and Disease Registry (ATSDR).

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Land-of-Sky Municipal Solid Waste Initiative

Size and location: The Land-of-Sky Regional Council has jurisdiction over solid waste activities in a four-county area (Buncombe, Transylvania, Henderson, and Madison Counties) with a population of 286,579.

Nature of EPA involvement: Land-of-Sky Regional Council and EPA are Partners in a Cooperative Agreement.

Organization that initiated project:

Land-of-Sky Regional Council, Asheville, North Carolina

Major environmental problems: The Land-of-Sky Regional Council four-county area generates about 1 million tons of municipal solid waste per year.

Action taken or proposed: The goal of the project is to reduce the amount of waste the four-county area will landfill. The project will focus on retention of existing businesses and attraction of new businesses to utilize the Region's recycled materials. The project will also focus on the number of jobs retained or created in each county. Diversion of the materials from the landfill will also extend landfill life allowing resources to be devoted to other priority projects.

Stakeholders: Stakeholders are Buncombe, Transylvania, Henderson, and Madison Counties and EPA.

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Mobile Bay Restoration Demonstrations

Size and location: The Mobile Bay estuarine drainage area covers 102,900 kilometers (39,725 square miles) in nine South Alabama counties. The surface area of the bay is about 1300 square kilometers (500 square miles).

Nature of EPA involvement: Funding assistance for all Gulf of Mexico Program activities associated with this initiative, providing technical input via steering committees, meetings, and workshops, and promotions of the Mobile Bay Restoration Demonstrations to other federal and state agencies.

Organizations that initiated project: Gulf of Mexico Program in conjunction with U.S. Fish and Wildlife Service (USFWS), Alabama Department of Environmental Management (ADEM), U.S. Army Corps of Engineers, Alabama Department of Economic and Community Affairs (ADECA), Natural Resources Conservation Service, National Marine Fisheries Society, National Aeronautics and Space Administration, U.S. Environmental Protection Agency Region IV.

Major environmental problems:

- Rapid growth in population
- Heavy shipping
- Damaged wetlands
- Loss of submerged seagrass beds
- Reduced water quality
- Closing of numerous oyster reefs

Actions taken or proposed: The Gulf of Mexico Program coordinated state and federal restoration demonstrations in Mobile Bay to provide an ecosystems approach to watershed environmental management. The program was instrumental in initiating the following projects within the Mobile watershed ecosystems:

- Implementation of activities in conjunction with USFWS and ADEM that demonstrate how water quality can be improved by restoring salt marsh and seagrass habitats, which act as water filters for nearby oyster reefs.
- Implementation of a program with the Alabama Department of Public Health and the Mobile County Health Department to monitor and control nonpoint sources of pollution affecting water quality for coastal waters. One project involves constructing a wetland to filter fertilizer and pesticide-laden runoff from a golf course.
- Development and implementation of a citizen monitoring support program—Bay Watch—to use citizen volunteers to gather information to target and followup on pollution control activities in the Mobile Bay watershed, in cooperation with ADEM.
- Coordinated development of a menu driven Geographic Information System to improve decisions made during section 404 wetland permit review for the Mobile Bay area.

Stakeholders:

ADECA
ADEM
Agriculture
Citizens using the bay for food and recreation
Development
Fisheries
Local and state governments in Alabama
Manufacturing and mining
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration/National Marine Fisheries Service
Natural Resources Conservation Service
Tourism
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Food and Drug Administration

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Loxahatchee River Basin Wetland Planning Project

Size and Location: Project area covers approximately 11,300 hectares (28,000 acres) in Martin and Palm Beach Counties, Florida.

Nature of EPA involvement: Project is an EPA-led initiative in cooperation with a county government and a regional planning council. EPA will assist the local sponsors in gathering scientific data on wetlands in the project area and will coordinate the project activities of the various agencies involved. The data are expected to be used by federal agencies as regulatory guidance under section 404 of the Clean Water Act, and by the local sponsors for activities such as creating zoning ordinances and mitigation site selection. This project is very similar to an Advance Identification (ADID) project except that designations of suitability for fill will not be made per se but will likely be replaced with designations of qualitative ecological value.

Organization that initiated project: Local environmental group made initial request, with subsequent support from local governments and other natural resource entities.

Major environmental problems: Concern over water quality and quantity in Loxahatchee River basin, intensified by the fact that the river has been designated as a National Wild and Scenic River and is the only one so designated in the state. Increasing encroachment by development into remaining wetlands is a primary concern.

Actions taken or proposed: Project is in initial stage. Core participants have been identified and goals set. Data gathering not yet under way. Next major task is formulation of wetland functional assessment method to analyze wetlands in the field.

Stakeholders:

EPA, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Martin and Palm Beach Counties, South Florida Water Management District, Florida Department of Environmental Protection, Treasure Coast Regional Planning Council.

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Pensacola Bay Watershed Evaluation

Size and location: Escambia and Santa Rosa Counties, Florida. Pensacola Bay is 133 square kilometers in area.

Nature of EPA involvement: Multiyear watershed evaluation to determine ecological status, sensitive ecological monitoring techniques, and risk assessment methodology.

Organization that initiated project:

U.S. EPA, Environmental Research Lab - Gulf Breeze, FL

Major environmental problems: Point source discharges, urban runoff, and agricultural runoff have impacted the bay.

Actions taken or proposed: None to date.

Stakeholders:

Cities of Pensacola and Gulf Breeze, Florida
Florida Northwest Water Management District
State of Florida Department of Environmental Protection
U.S. EPA Region IV

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Pearl River Wetlands Advance Identification (ADID) Project

Size and location: Size of area is 340 square kilometers/130 square miles (33,500 hectares/ 83,000 acres) total; 23,400 hectares (58,000 acres) of wetlands near Jackson, Mississippi.

Nature of EPA involvement: EPA has been the initiating force in this project. The U.S. Army Corps of Engineers, the state, and the U.S. Fish and Wildlife Service have provided technical assistance.

Organization that initiated project:
U.S. EPA

Major environmental problem: Bottomland hardwood wetlands are at risk from urban expansion from the Jackson metro area.

Actions taken or proposed: Area has been remotely assessed and land use/land cover maps generated. Area has also been hydrogeomorphically classified and assessed.

Stakeholders:
EPA, Corps of Engineers, U.S. Fish and Wildlife, and state agencies, as well as regulated public, will know where wetland areas are located.

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Sarasota Bay

Size and location: This project encompasses Sarasota Bay, Roberts Bay, Little Sarasota Bay, Dryman Bay, and Blackburn Bay and consists of a coastal watershed of approximately 389 square kilometers (150 square miles) of land area and 135 square kilometers (52 square miles) of water surface extending from Anna Maria Key south to Casey Key on the southwest coast of Florida.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the program.

Organizations that initiated project: This is a cooperative project stimulated by local governments and communities and Mote Marine Laboratory. Sarasota Bay was selected for inclusion in the National Estuary Program (NEP) by EPA in 1988. The Sarasota Bay NEP is sponsored by the Southwest Florida Water Management District, Manatee County, Sarasota County, the City of Sarasota, and EPA.

Major environmental problems:

- Excessive nitrogen loads due to inadequate wastewater treatment
- Storm water runoff
- Loss of natural habitat (freshwater and saltwater wetlands and submerged aquatic vegetation)

Actions taken or proposed: The NEP provides funds to develop a Comprehensive Conservation and Management Plan (CCMP) for Sarasota Bay that will recommend priority corrective actions to restore and maintain the estuarine resources. During the CCMP development, several demonstration projects are being undertaken to illustrate how the final recommendations for bay restoration will be implemented. These demonstrations include 11 habitat-related projects and 2 storm water management projects. The intertidal habitat restoration projects will restore 32 hectares (80 acres) of habitat lost since 1950. Implementation of the storm water projects will reduce the quantity an improve the quality of storm water discharge in specific basins, as well as providing valuable information about storm water management techniques in highly urbanized coastal areas. Local governments have made significant strides toward restoring and protecting the bay primarily by integrating the strategy of the Sarasota Bay NEP into community decisions that might affect the bay. Public education/-outreach and citizen involvement have been critical in allowing the Sarasota Bay NEP to progress to this point and will be essential in full implementation of the CCMP recommendations.

Action Plans have been drafted for inclusion in the CCMP. These plans address wastewater/ nitrogen loading reduction, storm water management, freshwater and saltwater wetlands restoration and protection, fisheries and other living resources, sustainable recreational use, and bay management (governance). The final CCMP will be completed in June 1995 and will propose not only the action plans needed to restore Sarasota Bay, but also who should take the lead for implementation activities, how much these activities will cost, how these activities will be funded, and a timeline for determining success of implementation.

Stakeholders:

Businesses
Local citizens
Property owners
Recreational users including divers, snorkelers, boaters, and anglers
Scientists
Tourists

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Rookery Bay Wetlands Advance Identification (ADID) Project

Size and location: 43,600 hectares (108,000 acres) in Collier County, Florida.

Nature of EPA involvement: EPA is coordinating this multiagency planning effort and providing major funding through cooperative agreements with state and local agencies and a local nonprofit organization.

Organization that initiated project: EPA initiated this project in cooperation with the Corps at the request of the state and a variety of environmental organizations.

Major environmental problems: Rapid urban growth in the Rookery Bay watershed is threatening the water quality in Rookery Bay and degrading the habitat for threatened and endangered species, such as the Florida panther and red-cockaded woodpecker. The misconception that melaleuca-infested wetlands and hydric pine flatwoods have no functional value is widespread in the area.

Actions taken or proposed: A multi-agency project team, including representatives from federal, state, and local government and a nonprofit environmental group is developing a geographic information system (GIS) data base with information on project area wetland types, soils, sub-basin boundaries, and impact areas for major drainage canals. Limited field testing is being conducted to fill data gaps in wildlife usage of the area, document hydrology in hydric pine flatwoods, and assess impacts of drainage canals on wetland hydrology. Maps and a technical document will be produced designating the suitability of project area wetlands for filling based on the functions provided by the wetlands. These products will be available to government agencies and the general public for use in preliminary planning for project area wetlands. Citizens are being educated about local wetlands through public meetings, informational mailings, and development and distribution of a Rookery Bay Watershed poster.

Stakeholders:

Government agencies that regulate natural resources, landowners, land developers, environmental groups, environmental consultants, real estate agents, citrus/vegetable growers, and recreational and commercial fish/shellfish industries.

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City of Beaufort, South Carolina
Duke Power
Federal Paper Board Corporation
Fort Howard Company
Georgia Conservancy
Georgia Department of Natural Resources
Georgia Environmental Protection
Lower Savannah Council of Governments
National Park Service
Natural Resources Conservation Service
Savannah Area Chamber of Commerce
Savannah River Forum
Sierra Club
South Carolina Coastal Council
South Carolina Department of Health and Environmental Control
South Carolina Department of Natural Resources
South Carolina Electric and Gas
South Carolina Sea Grant Consortium
Southeastern Power Administration
Southern Environmental Law Center
Stone Savannah River Company
U.S. Army Corps of Engineers
U.S. Department of Energy - Savannah River Site
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Union Camp Corporation
Westinghouse Savannah River Company

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Savannah River Basin

Size and location: The Savannah River basin is a 25,900-square-kilometer/10,000-square-mile watershed located in the southeastern United States and includes portions of North Carolina, South Carolina, and Georgia. The Savannah River, which is the boundary between South Carolina and Georgia, is formed at Hartwell Reservoir by the confluence of the Seneca and Tugaloo Rivers and flows southeast to the Atlantic Ocean at the port city of Savannah, Georgia. Above the junction of the Seneca and Tugaloo Rivers, the major headwater streams of the Seneca River are the Keowee River and Twelve Mile Creek. The Tugaloo River is formed by the union of the Tallulah and Chattooga Rivers. These headwater streams originate on the southern slopes of the Blue Ridge Mountains in North Carolina and Georgia.

Nature of EPA involvement: EPA is providing leadership and coordination support for this project. EPA has also provided financial support for watershed demonstration projects and has also provided staff support for projects such as water quality field sampling and modeling.

Organization that initiated project:

U.S. EPA

Major environmental problems:

- Impaired fisheries due to poor water quality
- Low dissolved oxygen (DO) in Savannah River and Estuary
- Savannah River Site (listed as a Superfund site in 1989) discharges and releases
- Negative water quality impacts on public drinking water supplies
- Nonpoint source impacts from forestry, agriculture, and urban land use
- Salinity in estuary—impacts on public/private drinking water supplies, fisheries, wetlands
- Sedimentation in the estuary causing navigation problems and increased dredging
- Modification and physical changes in the estuary
- Point source discharge effects
- Dam release impacts—e.g., fish kills, cold water releases, low DO releases
- Development impacts—e.g., development near urban areas, river access projects, wetland losses, possible future harbor development
- Habitat alteration/destruction—e.g., dredging, salinity impacts, sedimentation, hydropower releases, development
- Commercial shipping impacts on harbor water quality
- Water quality impact of drought management plans—e.g., low-flow scenarios
- Urban storm water runoff
- Ground water quantity limitations due to saltwater intrusion and drawdown and the potential interaction with surface water

Actions taken or proposed: EPA began working in 1992 with the water quality agencies of Georgia and South Carolina to reach consensus on the nature and scope of this project. A multiagency/organization meeting with stakeholders in the basin to plan and organize a comprehensive and integrated watershed project followed. Actions are under way to develop a Watershed Assessment Report that includes input on priority actions from all basin stakeholders. An organizational structure has been developed to manage the project and includes equal representation from major stakeholders. Additionally, resource-based subcommittees will provide the technical support for this project. There is a great deal of interest in coordinated management of the natural resources of the Savannah River basin, and the many stakeholders in the basin are committed to participation in project management, planning, and implementation. The Watershed Assessment Report will be a guide for implementation of priority actions by basin stakeholders.

Stakeholders:

Augusta Canal Authority
Augusta Chamber of Commerce
Central Savannah Regional Development Center

South Florida Wetlands Permitting and Mitigation Strategy

Stakeholders:

Florida Department of Community Affairs
Florida Department of Environmental Protection
Florida Game and Freshwater Fish Commission
Local governments
National and local environmental groups
Native American tribes
South Florida agricultural, urban, and other interests
South Florida Water Management District
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of Interior
U.S. Environmental Protection Agency

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South Florida Wetlands Permitting and Mitigation Strategy

Size and location: Wetland habitats, which cover a significant portion of the land area, are scattered throughout South Florida, a 41,000-square-kilometer (16,000-square-mile) watershed located at the southern terminus of the Florida peninsula.

Nature of EPA involvement: EPA Region IV and the U.S. Army Corps of Engineers (COE) are leading the effort to develop a Comprehensive South Florida Wetlands Permitting and Mitigation Strategy, as recommended by the Federal Interagency Working Group in its 1994 Annual Report. The strategy will provide a forum for focusing federal and state activities in South Florida, and it will identify mechanisms for improving decision-making processes. It will include the development of a Wetlands Conservation Plan by September 1996.

Organizations that initiated project:

U.S. EPA Region IV
U.S. Army Corps of Engineers

Major environmental problems:

- Historic wetland losses combined with major hydrologic alterations of the ecosystem
- Invasion of exotic plant species
- Rapid population growth and concomitant development subjects the remaining wetlands to removal or alteration
- Loss of native species of flora and fauna
- Land use designations that conflict with the long-term viability of the wetland habitats
- Individual permits issued on a case-by-case basis without a complete assessment of the cumulative impacts

Actions taken or proposed:

- Several meetings between federal and state agencies and the South Florida Water Management District have been held to develop the scope of the project and to coordinate the numerous related activities occurring in South Florida.
- The draft "Scope of Work" identifies eight tasks to be developed: (1) the formation of a Steering Committee; (2) geographic information system (GIS) networking to develop the GIS coordination required to complete the tasks and to share data among the agencies GIS data; (3) the development and use of land cover classification and other map products; (4) development of a functional assessment methodology for assessing the wetlands and other habitats of South Florida; (5) identification of important natural areas, including wetlands, buffer areas, transitional zones and uplands, critical to the continued functioning of adjacent wetlands; (6) identification of areas where intense development pressures require further detailed assessments to be performed as quickly as possible; (7) the identification of areas that provide opportunity for preservation, restoration, and enhancement; and (8) development of an implementation plan that will identify the specific activities, actions, responsible agencies, and timelines for implementing the strategy.
- A Steering Committee will be formed in February 1995 to prepare the strategy and identify cooperative efforts to be completed by each member agency. This group will be composed of tribal, federal, state, Water Management District, and local agencies. This group will define the scope of the initial product due by September 1996; provide for updates, maintenance, and expansion of the project; and provide advice and guidance on accomplishing other Working Group recommendations.

Tri-State Initiative

Size and location: Covering 600,000 hectares (1.5 million acres) and including 368,000 people, the Tri-State Initiative is located where the states of Ohio, West Virginia and Kentucky meet and includes the counties of Boyd and Greenup (Kentucky), Lawrence and Scioto (Ohio), and Wayne and Cabell (West Virginia).

Nature of EPA involvement: To assist in a collective effort to define, remediate, and prevent environmental threats in the tri-state area.

Organization that initiated the project:
U.S. EPA

Major environmental problems: This area was selected because of the following high risk/priority indicators: pollutants released into the environment; known/suspected environmental problems; local meteorological conditions; and the level of public concern expressed to EPA.

Actions taken or proposed: The Air Quality, Risk Analysis, Pollution Prevention, Geographic Information System (GIS), and Public Relations workgroups are currently working on the following projects: Industry and Community Discussions, Risk Screening/GIS Mapping, Air Toxics Study, Pollution Prevention, and a Surface Water Study. Teams on the inactive status include Groundwater, Waste, and Compliance.

Stakeholders:
- Agency for Toxic Substances and Disease Registry
- EPA Regions III, IV and V
- Kentucky Department of Environmental Protection
- Kentucky Partners
- Ohio Environmental Protection Agency
- Ohio River Valley Sanitation Commission
- Portsmouth Local Air Quality Agency
- West Virginia Division of Environmental Protection

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Tampa Bay

Size and location: The Tampa Bay National Estuary Program (NEP) study area encompasses both the 1031-square-kilometer (398-square-mile) bay and its 5960-square-kilometer (2300-square-mile) watershed. The watershed extends north of the bay to the upper reaches of the Hillsborough River, east to the headwaters of the Alafia River, and south to Sarasota County. Tampa Bay is the longest bay in the state of Florida and the seventh longest in the United States.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the program.

Organizations that initiated project: The Tampa Bay Regional Planning Council, the Southwest Florida Water Management District, state and local governments, and citizens began an effort culminating with EPA selecting Tampa Bay for inclusion in the National Estuary Program in 1990.

Major environmental problems:

- Growth and development causing habitat destruction, shoreline hardening, and increased anthropogenic impacts
- Pollutant loadings from both point and nonpoint sources
- Loss and degradation of primary habitats within and around the bay such as tidal marshes, mangroves, seagrasses, nonvegetated bay bottom, and open water (pelagic) communities
- Alteration of surface and ground water flow patterns
- Atmospheric deposition (nitrogen)

Actions taken or proposed: The NEP provides funds to develop a Comprehensive Conservation and Management Plan for Tampa Bay that will recommend priority corrective actions to restore and maintain the estuarine resources. The Tampa Bay NEP intends to approach bay restoration and measures of success by linking water quality standards to the environmental needs of bay habitats and the aquatic communities they support. Scientists will monitor representative plant and animal species from each of the bay's communities to determine the overall health of that portion of the bay. Assessing the condition of these indicator species will provide tangible evidence of progress toward goals. The program is currently completing a comprehensive review of conditions in the bay, as well as scientific studies that will define the environmental requirements of key species. By moving beyond water quality as the end result in bay restoration to standards that measure success based on the health of the bay's living resources, scientists hope to encourage more resource-based initiatives in environmental management.

Stakeholders:

Anglers
Businesses
Local citizens
Recreational users, including anglers, divers, snorkelers, and boaters
Tourists

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West Broward County Wetlands Advance Identification (ADID) Project

Size and location: Project encompasses 78 square kilometers (30 square miles) in Broward County, southeastern Florida.

Nature of EPA involvement: ADIDs are EPA-led initiatives in cooperation with a state and/or local government or agency. EPA acts to assist the state or local sponsor in gathering scientific data on wetlands in a defined geographic area and coordinates the project activities of the various agencies involved. EPA also produces the Technical Summary Document describing the project findings and regulatory implications. This project was one of the first to be undertaken in the Region and initially was performed only by EPA and the Corps. Assistance by other federal and local agencies has grown significantly in latter half of project period. The data are to be used by federal government agencies as regulatory guidance under section 404 of the Clean Water Act.

Organization that initiated project:

U.S EPA

Major environmental problems: Continued urban encroachment into the eastern boundary of the Everglades and associated concern for quality of public health and wildlife habitat.

Actions taken or proposed: Project is near completion. All data have been gathered and wetlands designated regarding suitability for filling. Approximately half of project area designated as suitable for development in draft Technical Summary Document due to drainage, habitat fragmentation, and other factors.

Stakeholders:

Primarily EPA, U.S. Army Corps of Engineers, Broward County, U.S. Fish and Wildlife Service, Florida Department of Environmental Management and other agencies.

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Weeks Bay Estuarine Research Project

Size and location: Weeks Bay is located in Baldwin County, Alabama, and covers 694 hectares (1718 acres).

Nature of EPA involvement: Cooperative research with Gulf Coast Research Laboratory (Mississippi) to determine ecological status and establish baseline parameters for a Gulf Coast reference site.

Organization that initiated project:

U.S. EPA, Environmental Research Lab - Gulf Breeze, FL

Major environmental problems: Agricultural runoff during periods of high rainfall and wetland development are impacting area.

Actions taken or proposed: Protection of ripariran zone to buffer pesticide input.

Stakeholders:

National Oceanic and Atmospheric Administration
State of Alabama
U.S. EPA Region IV

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West Kentucky Coalfield Wetlands Advance Identification (ADID) Project

Size and location: Hopkins, Muhlenburg, and Ohio Counties, Kentucky. Project covers approximately 5300 square kilometers/2040 square miles (20,600 hectares/75,720 acres) of wetlands.

Nature of EPA involvement: EPA Advanced Identification Project. EPA staff have been intimately involved with the design, implementation, and writing of the report.

Organizations that initiated the project:

U.S. EPA
Kentucky Environmental Protection Cabinet

Major environmental problems: Coal mining and agriculture

Actions taken or proposed: Area wetlands have been hydrogeomorphically classified and assessed. Recommendations for designation of areas as "unsuitable for fill" will depend on a site's overall level of function and its status as a "target reference" site for restoration.

Stakeholders:

Agricultural Interests
Coal Mining Industry
Kentucky Environmental Protection Cabinet
U.S. EPA

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West Chatham County Wetlands Advance Identification (ADID) Project

Size and location: 18,000 hectares (45,000 acres) northwest of Savannah, Georgia.

Nature of EPA involvement: Awarded grant to the local sponsor, Chatham County - Savannah Metropolitan Planning Commission (MPC), to assist in its participation; funded Interagency Agreements (IAGs) with Fish and Wildlife Service and Natural Resources Conservation Service for their participation; EPA project officer spends one-third time serving as coordinator.

Organization that initiated project: U.S. EPA, at the request of MPC

Major environmental problems: Exurban expansion of Savannah into flatwoods wetlands

Actions taken or proposed: Year-long field studies of ground water and wildlife use/habitat have been completed; geographic information system (GIS) models for delineation and assessment have been constructed; and model coverages and parameters have been derived. Project goals are elucidation of flatwoods hydrology, separation of marginally hydric soils into wet and dry phases, remote delineation, and functional assessment. This ADID should serve as an example for similar areas in the South Atlantic Coastal Plain. The results should be incorporated into federal regulatory and local planning processes, as well as local PE&O.

Stakeholders:

City/County residents, local developers, property owners, political leaders, and environmental activists; county planners and federal regulators

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Region V Projects

Example projects submitted by Region V include the 17 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on river basins, and several are Areas of Concern, which involve the U.S./Canada boundary's important or sensitive areas. Many projects are oriented toward the environmental effects of urbanization. Urban runoff and sedimentation, solid waste disposal, toxics and contaminated sediments, declining wildlife populations, fish consumption advisories, urban development pressures, agricultural runoff, pathogens, hypoxia, point source discharges, atmospheric deposition, habitat loss, and loss of outdoor recreational uses are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the Great Lakes Program, the ICEM Upper Midwest Initiative, and the EMAP Lake Superior Assessment.

Region V projects in the Inventory at this time include:

Ashtabula River Area of Concern, OH
Big Darby Creek, OH
Cache River, IL
Clinton River Area of Concern, MI
Lake Michigan, IL, IN, MI, WI
Lake Superior EMAP - Great Lakes Assessment, MI, MN, WI
Lower Mississippi Alluvial Valley Wetland Conservation Plan, IL, LA, MS, AR, KY, TN, MO*
Maumee River Area of Concern, OH
Milwaukee Estuary Area of Concern, WI
Mississippi River Gateway Project, IL, MO*
Northwest Indiana Environmental Initiative, IN
Saginaw Bay, MI
Saginaw Bay Urban Targeting Project, MI
St. Mary's River, MI
Southeast Chicago Urban Environmental Initiative, IL
Southeast Michigan Initiative, MI
Tri-State Initiative, KY, OH, WV*

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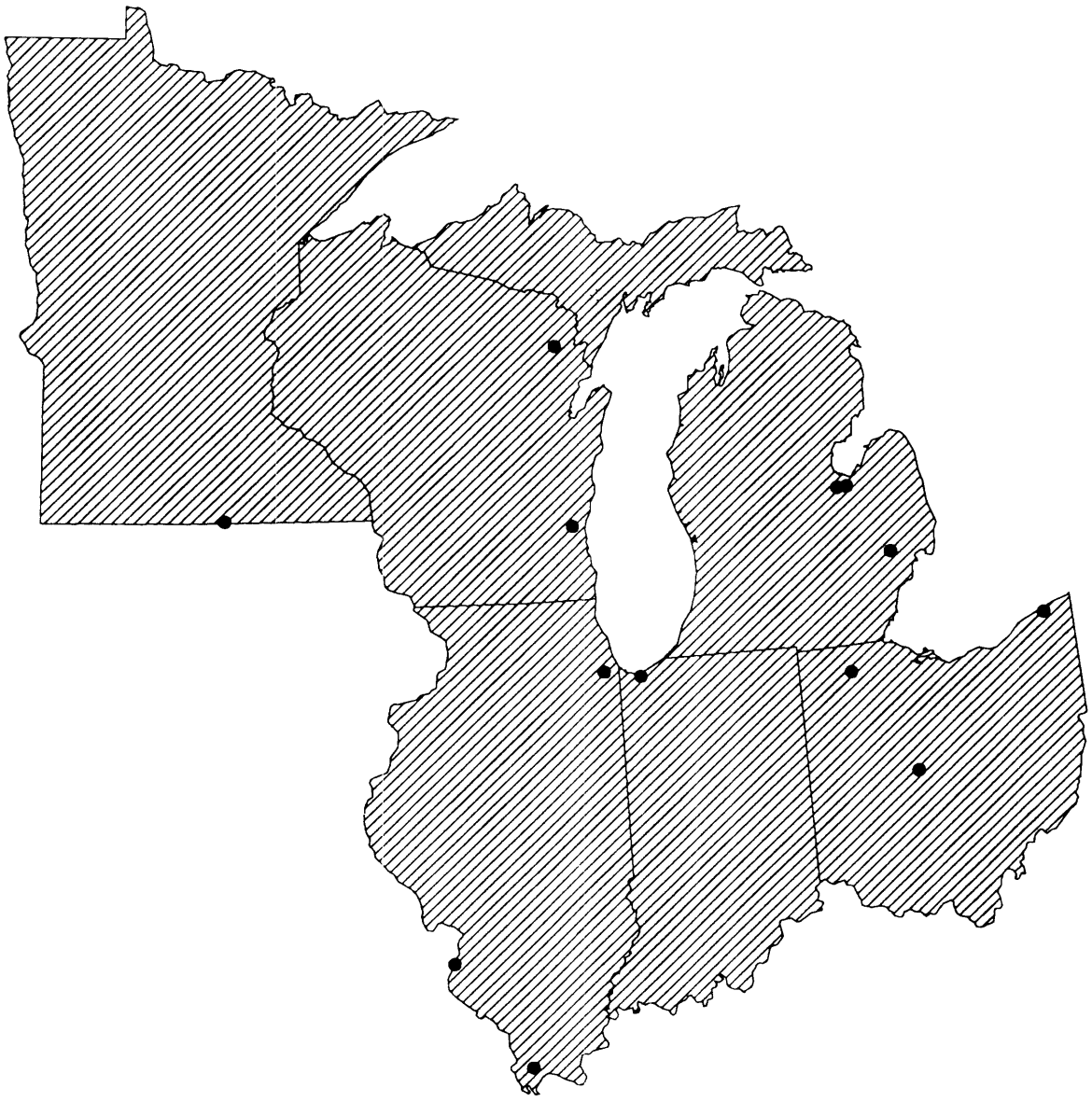
* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Figure 6:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 5 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

● Reference point for local-scale project

State Boundary

Scale 1:8,750,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-5/10
Area boundaries and reference point locations are approximate.

to contaminated sediments and will, if necessary, assess potential risks and potential remedial alternatives associated with this risks.

Stakeholders:

Boaters
City manager
Congressional staff
Industry
Local citizens
Local government agencies
Ohio Environmental Protection Agency
Ohio Sea Grant
Port authority
Soil and Water Conservation District
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Ashtabula River Area of Concern

Size and location: The Ashtabula River Area of Concern (AOC) is located in the northeast corner of Ohio. It includes the watershed for the lower Ashtabula River, its tributaries, and the harbor and nearshore of Lake Erie. One of the tributaries, Fields Brook (Brook), is a Superfund site.

Nature of EPA involvement: Region 5 is interested in and committed to trying an alternative remediation approach at Ashtabula; specifically, a public-private partnership of agencies and local entities. By using a broader base of interests and resources including multiple statutory authorities of U.S. EPA, U.S. Army Corps of Engineers, and Ohio Environmental Protection Agency (Ohio EPA), a more cost-effective remediation can occur. U.S. EPA is facilitating the partnership, which includes local industries, government, and the Remedial Action Plan Committee. Working with Superfund program activities is also critical to partnership success.

Organizations that initiated project:

U.S. Congress
U.S. EPA
Ohio EPA

Major environmental problems:

- Contaminated sediments (contaminants of concern include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), hexachlorobenzene, hexachlorobutadiene, and to a lesser degree some metals)
- Degraded fish and wildlife populations
- Consumption of unhealthy fish and wildlife
- Degradation of fish habitat
- Degradation of benthos

Actions taken or proposed: The Ashtabula River AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. A RAP Advisory Council, composed of local stakeholders, has been established. Stage I of the RAP, which describes the nature and extent of the problems, was completed in 1992, and approved by EPA and the International Joint Commission in late 1992. Stage II, which devises a plan for implementing remediation, is in its conceptual stages. Recently, the Advisory Council decided to initiate a new tool in developing Stage II.

Focusing on the contaminated sediments in the entire watershed, the Advisory Council is seeking to develop a public-private partnership in the Ashtabula. The partnership would combine sediment projects in the AOC; the authorities of different agencies; different potential funding sources; and the goals of the RAP, citizens, and agencies to save time, money, and effort in developing a solution. Already a partnership charter has been signed by stakeholders, agencies, and industrial firms; and more than half a million dollars has been committed by EPA, the Ohio EPA, and the Corps to investigate multiparty remediation plans. The funds will be used to study locations for and to design a disposal facility to hold contaminated sediments. It is hoped that a consensus-based plan focusing on the entire watershed can be used to remediate the area instead of Superfund. While Superfund is continuing studies of the river contamination at this time, EPA is holding off on formally designating the downstream river a Superfund site to see how the partnership develops.

Superfund activities on the upstream, highly contaminated Brook are continuing and include:

- A Record of Decision in 1986, which directs design of the Fields Brook Sediment cleanup.
- A Remedial Investigation and Feasibility Study to be completed in 1995 describing contamination and possible remedial alternatives for sources of contamination along the Brook to ensure that the Brook is not recontaminated.

In addition, an ecological assessment of the floodplain and wetland area surrounding the Brook is being conducted and should be completed in early 1995.

Superfund activities in the river are assessing how wildlife and humans might be exposed

vey is in its third year of measuring discharge rates and suspended solids from three in-stream gauging stations to identify long-term trends. Nutrients and pesticides have been monitored during storm events. The Ohio EPA has evaluated the ecological condition of the stream since 1979. Biological sampling in 1992 and 1993, in general, revealed improvements in community index scores since 1979. The removal of two dams has permitted the upstream migration of some species. Only one dam remains on the mainstem.

Stakeholders:

Watershed residents
Darby Creek Association
Little Darby Creek Preservation Association
Operation Future Association
Big Darby Partners
Local governments, agencies, and officials (townships, towns, cities, and counties)
Soil and Water Conservation Districts
General public
Private corporations
The Nature Conservancy
In Defense of Endangered Species
Rivers Unlimited
Columbus and Franklin County Metropolitan Park District (Metro Park)
Mid Ohio Regional Planning Commission
Ohio Department of Natural Resources
Ohio Environmental Protection Agency
Ohio State University
Ohio State University Extension Service
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Geological Survey
U.S. Fish and Wildlife Service
USDA Farm Service Agency
USDA Natural Resources Conservation Service

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Big Darby Creek

Size and location: The Big Darby Creek watershed is located in west-central Ohio. The watershed drains 1443 square kilometers (557 square miles).

Nature of EPA involvement: EPA has provided funding through sections 104(b)(3) and 319 of the Clean Water Act and has participated in conducting an ecological risk assessment for the watershed.

Organizations that initiated project: Citizen action groups, such as the Darby Creek Association, along with the Ohio Department of Natural Resources and Ohio Environmental Protection Agency (Ohio EPA) worked to designate portions of the Big and Little Darby Creeks as a State and Federal Scenic River. The Nature Conservancy has raised local and national awareness of the Big Darby Creek watershed and has helped to recruit and coordinate stakeholders into the Darby Partners. The stakeholders have initiated ecologically important projects in the watershed including the projects involving the U.S. EPA.

The projects funded through section 319 were initiated by the Union Soil and Water Conservation District, Franklin Soil and Water Conservation District, Natural Resources Conservation Service, Ohio Department of Natural Resources, and Ohio State University. The Risk Assessment project was initiated by the Ohio EPA in response to a request for proposals from the Office of Water.

Major environmental problems:

- Point and nonpoint source stressors associated with agricultural and residential land uses
- Projections of increased stress from the conversion of agricultural land to urban and suburban development

Actions taken or proposed: The Ohio Department of Natural Resources and The Nature Conservancy, along with other stakeholders, have identified the Big Darby Creek as a high-priority area for protection of biological diversity and are trying to develop a long-term management and protection plan for the river and riparian areas. The U.S. EPA through the Office of Water and Office of Research and Development, and the Ohio EPA are jointly leading an ecological risk assessment case study. The intent of the case study is to clearly identify risks to Big Darby Creek so that managers can guide development and land use in a manner that (1) attains state criteria for designated uses for the Eastern Corn Belt Plains ecoregion throughout the entire Big Darby Creek watershed; (2) maintains exceptional warm-water criteria for stream segments having that designation between 1990 and 1995; and (3) allows native species to continue to exist in the watershed.

To achieve short-term improvements in both agricultural and suburban areas, the U.S. EPA is providing grants through section 319 of the Clean Water Act. One project supported the compilation of a geographic information system data base that is used to identify erodible lands and the benefits of conservation practices. In other programs, residents and county officials were taught new technologies and conservation practices along with basic information about the ecology of the watershed. Several agricultural projects involved the installation and monitoring of best management practices.

Another grant, under section 104(b)(3) of the Clean Water Act, funded a study of storm water in rapidly growing areas of the watershed and supported activities to reduce the effects of urban pollution through compliance, best management practices, and education.

In conjunction with these projects, matching funding and assistance has come from the City of Columbus, Ohio Department of Natural Resources, Ohio State University, The Nature Conservancy, Franklin Soil and Water Conservation District, and the Natural Resources Conservation Service. A conservation tillage and increased critical area seedings project, sponsored by the U.S. Department of Agriculture, has been established for the watershed. The project has a goal of reducing sediment by 45,450 metric tons (50,000 U.S. tons). As of the end of FY94, sediment reduction to the stream is estimated at 26,200 metric tons (28,800 U.S. tons). Gross erosion has been reduced by 371,000 metric tons (408,000 U.S. tons). The U.S. Geological Sur-

Clinton River Area of Concern

Size and location: The Clinton River is located in southeastern Michigan, just north of Detroit. The river flows 130 kilometers (80 miles) from its headwaters to Lake St. Clair near Mt. Clemens and is a tributary in the Lake Erie watershed. Before entering Lake St. Clair, the river flows through a natural channel and a man-made spillway. The Area of Concern (AOC) consists of the main branch of the Clinton River downstream of Red Run (a major tributary of the Clinton River) to the mouth (27 kilometers/17 miles) and the spillway (3.2 kilometers/2 miles).

Nature of EPA involvement: EPA provides funding for the Clinton River Area of Concern, and also participates in its advisory committee.

Organizations that initiated project:

Michigan Department of Natural Resources
U.S. EPA

Major environmental problems:

- Degradation of benthos
- Degradation of fish populations and habitat
- Contaminated sediments (contaminants include PCBs, heavy metals, cyanide, ammonia, oil and grease, and phenol)
- High fecal coliform bacteria levels
- Low dissolved oxygen levels
- Increased sedimentation (due to the naturally occurring problems of low flow and the decreased slope of the river)
- Municipal and industrial discharges
- Nonpoint sources of contaminants from urban storm water, agricultural runoff, combined sewer overflows (CSOs), ground water contamination, and atmospheric deposition

Actions taken or proposed: The Clinton River AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. Stage II of the RAP, which identifies proposed remedial actions and their method of implementation, is targeted for completion by April 1996. The RAP includes 23 recommendations; of these, 6 are for specified actions and 14 call for investigations to provide information for further decision-making. Three programs called for in the RAP are under way: nonpoint source and erosion control, air quality and monitoring, and watershed-funded clearinghouse.

In addition, a variety of other activities have been taken or are under way including:

- Navigational channel dredging to increase flow rate substantially during high-flow periods only.
- Sediment deposits dredged from behind the spillway weir.
- A reconnaissance/feasibility study, which is being done by the U.S. Army Corps of Engineers, to redesign the weir to allow fish to pass over. The design study will follow in the near future.
- Current development of a spill response plan for Red Run Drain (portion of the Red Run that has been placed underground).
- Clean-up activities proceeding at four Superfund sites.
- Reissuance of National Pollutant Discharge Elimination System permits for three wastewater treatment plants, including provisions for treatment or elimination of CSOs, by the Michigan Department of Natural Resources (MDNR).
- Upgrading of wastewater treatment plants by nine towns in the AOC, reducing discharge of both conventional and toxic pollutants and bacterial contamination.
- Biological surveys and reports completed under nonpoint source surveillance for seven tributaries.
- Installation of a bottom draw structure at the Lake Orion dam, resulting in cooler water discharges to Paint Creek, a tributary to the Clinton River, increasing suitable trout water through the summer.

Cache River

Size and location: The Cache River is located in southern Illinois and is a tributary of the Ohio River. Its watershed covers approximately 191,500 hectares (474,000 acres), most of which is agricultural land and the Shawnee National Forest.

Nature of EPA involvement: EPA has provided funding for a watershed Resource Planning Initiative, cosponsored by The Nature Conservancy and the Natural Resources Conservation Service. EPA has also been involved in funding waste treatment plants for local towns and a solid waste study for the region.

Organization that initiated project:

The Nature Conservancy

Major environmental problems:

- Sediment and chemical pollution from farming practices
- Illegal dumping

Actions taken or proposed: The Nature Conservancy first began buying land in the Cache River watershed in the late 1960s. Since then, the Cache River State Natural Area has been established by the Illinois Department of Conservation (IDOC), and numerous federal, state, and local parties have formed the Cache River Consortium to address restoration activities in the watershed. EPA has funded a water resource planning initiative to identify and obtain land easements in critical areas. EPA is also funding wastewater treatment plants in local towns and a solid waste initiative study.

The Consortium is developing plans to address major resource concerns in the watershed, including erosion, open dumping, and water quality. The U.S. Army Corps of Engineers is embarking on a $1.3 million, 3-year study to examine the feasibility of installing a number of water and sediment control structures. This study is being cost-shared by 50 percent with IDOC. Efforts in the watershed also include scientific research by Southern Illinois University, reforestation and wetland creation, and recent implementation of a water quality monitoring program.

Stakeholders:

Ducks Unlimited
Illinois Department of Conservation
Illinois Environmental Protection Agency
Illinois Natural Preserves Commission
Illinois State Water Survey
Natural Resources Conservation Service
Shawnee National Forest
Southern Illinois University
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Lake Michigan

Size and location: Lake Michigan is 494 kilometers (307 miles) long and 189 kilometers (118 miles) wide, covering 57,750 square kilometers (22,300 square miles) of area. Another 118,100 square kilometers (45,600 square miles) of land drain, into the lake, and the watershed extends across the States of Illinois, Indiana, Michigan, and Wisconsin.

Nature of EPA involvement: In the Great Lakes Critical Programs Act of 1990, Congress designated U.S. EPA as the lead agency responsible for the Lake Michigan Lakewide Management Plan (LaMP). Therefore, EPA Region V Water Division chairs the multi-agency workgroup charged with developing and implementing the LaMP. EPA staff participate in technical workgroups and ensure public participation in the LaMP process. EPA, along with the states and other federal agencies, also provides funding for the LaMP implementation projects in the Lake Michigan watershed.

Organization that initiated project:
U.S. Congress

Major environmental problems:
Toxic pollutants

Actions taken or proposed: Under the Great Lakes Water Quality Agreement between the United States and Canada, a LaMP for Critical Pollutants has been developed for Lake Michigan. A draft LaMP was published in 1992, and revisions were made based on the public comments received. A second draft was published in the *Federal Register* in late 1994. The final LaMP will be published in 1995. The goal of the LaMP is to reduce toxic pollutants to restore the beneficial uses of Lake Michigan and prevent any further degradation of the lake system from the release of toxic pollutants.

Several activities have already been initiated directly through the Lake Michigan LaMP process. These include:

- Tributary and air deposition monitoring for LaMP pollutants.
- Sediment assessment and remediation projects for Lincoln Park Gun Club, Illinois; Manistee Lake, Michigan; and Trail Creek, Indiana.
- Agricultural "clean sweep" collections for pesticides in Indiana, Michigan, and Wisconsin.
- Urban "clean sweep" in northwest Indiana.
- Pollution prevention technical assistance and education projects in Milwaukee, Wisconsin; Chicago, Illinois; and western Michigan.
- Development of a mass balance model for Lake Michigan.
- Assessment of potential pollutant loads to Lake Michigan from contaminated sediments.
- Development of the Great Lakes Envirofacts data management system to provide access to loadings and ambient data as well as programmatic data bases.

A number of other projects are planned or will be implemented based on results of the monitoring study or further review of existing information. These include:

- Continue sediment remediation at high-priority sites, and use results of the Assessment and Remediation of Contaminated Sediments (ARCS) study to select appropriate remediation technologies.
- Continue to identify pollution prevention needs and opportunities for LaMP pollutants.
- Develop and monitor chemical and biological indicators of ecological health to track progress toward restoration of beneficial uses.

Stakeholders:
Chippewa/Ottawa Fishery Treaty Management Authority
Illinois Environmental Protection Agency
Indiana Department of Environmental Management
Industry
Local citizens
Local governments

- Implementation of best management practices to control and prevent non-point sources of pollution to Gallagher Creek, a tributary to the Clinton River, with focus on storm water control and ordinance standards.
- Development of a training video and manual for the Clinton River Early Warning System (CREWS), a voluntary network of residents who help detect spills by observing water conditions such as odor and color and reporting changes to the fire department These activities were funded by the Clinton River Watershed Council using a Public Participation Grant from the state.
- Ongoing citizen cleanups and a River Watch program (for reporting of spills).
- MDNR obligation of $120,000 to conduct remedial investigations to identify the sources of PCBs to the Clinton River.

Stakeholders:

Clinton River Remedial Action Plan Public Advisory Council
Clinton River Watershed Council
Michigan Department of Natural Resources
Mt. Clemens River Improvement Program (a collection of local entities, including the City of Mt. Clemens, citizen groups, service organizations, and local corporations)
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Lake Superior EMAP - Great Lakes Assessment

Size and location: South shore of Lake Superior from Duluth, Minnesota, to Sault Ste. Marie, Michigan. Nearshore samples include areas of the lake from shoreline to a depth of 100 meters.

Nature of EPA involvement: The Great Lakes Environmental Monitoring and Assessment Program (EMAP) at EPA's Environmental Research Laboratory-Duluth (ERL-D) is coordinating the research to develop and test indicators of trophic status and biological integrity in Great Lakes systems. Research efforts on Lake Superior are being supported through a combination of in-house and contract staff using the laboratory's 82-foot research vessel. These efforts include collaboration with EPA's Great Lakes National Program Office (GLNPO), the National Biological Survey (NBS), and the National Oceanic and Atmospheric Administration (NOAA).

Organizations that initiated project:

U.S. EPA EMAP-Great Lakes
U.S. EPA ERL-Duluth

Major environmental problems: The Great Lakes aquatic communities continue to be exposed to a multiplicity of physical, biological, and chemical stresses. The major environmental stresses include loss of biodiversity due to overfishing and fish stocking, degradation and loss of tributary and nearshore habitat, impacts of persistent toxic contaminants, and eutrophication in localized areas. Because Lake Superior is generally considered to be the healthiest of the Great Lakes, additional international concern has been expressed over the sustainability of this condition. It is also the least studied and understood of the Great Lakes.

Actions taken or proposed: A series of ecosystem-level measurements are being taken to assess the effects of stressors on the ecological health of Lake Superior. In addition to improving our knowledge of the condition of the lake, data from the field experiments will be used to develop, update, calibrate, and validate ecological response models (diatom succession, aquatic bioenergetics, and top-predator population models). Stressor and response models will be applied to the data collected to predict the effects of historical, present, and future management scenarios.

Stakeholders: U.S. EPA ERL has been collaborating with the NBS, NOAA, GLNPO, and the International Joint Commission (IJC) during the planning, experimental, and assessment phases of these projects. Assessment tools and results will be communicated to appropriate management agencies and programs (e.g., GLNPO, Regions, states, and other federal agencies) to assist in developing fish and contaminant management approaches.

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U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
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Maumee River Area of Concern

Size and location: The Maumee River Area of Concern (AOC) is in Lucas County in northwest Ohio. It includes the Maumee Bay at the southwestern corner of Lake Erie.

Nature of EPA involvement: EPA provides funding for the Maumee River Area of Concern and also participates in its advisory committee.

Organization that initiated project:

Ohio Environmental Protection Agency (Ohio EPA)

Major environmental problems:

- Degradation of fish and wildlife populations
- Loss of fish and wildlife habitat
- Degradation of benthos
- Eutrophication or undesirable algae
- Impaired drinking water
- Beach closings
- Historical discharges from wastewater treatment facilities
- Industrial dischargers
- Combined sewer overflows (CSOs) and urban runoff
- Agricultural runoff
- Dredge disposal
- Contaminated sediments
- Contamination from abandoned hazardous waste sites

Actions taken or proposed: The Maumee River AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. In October 1990 the Stage I report of the RAP, which describes the nature and extent of the problems, was completed. Stage II activities, which focus on identifying remedial actions and implementation methods, are being conducted.

Data collection efforts have begun in the mainstream Maumee and tributaries to assess the extent of contaminated sediments and degraded fish and benthos communities and to evaluate water quality. The agricultural committee has developed a management policy statement to provide a greenway and buffer strip along all Maumee River and tributary waterways to inhibit further erosion.

Other actions include:

- Completion of basinwide intensive surveys (1992-ongoing).
- Intensive investigation of landfill sources, pathways, and impacts on the AOC.
- Development of public involvement activities (e.g., workgroups, cleanups, evening socials, and Maumee River-related events).
- Evaluation of hazardous waste sites under the Superfund Accelerated Cleanup Model.
- Sediment screening of Ottawa River.
- Reduction of combined sewer overflow (CSO) bypassing to the Maumee River and tributaries as a result of a recently completed deep tunnel reservoir project by the Toledo Bayview Plant.
- Completion of the second field season of a massive effort to evaluate the fish, macroinvertebrates, sediment, and habitat of the Maumee River and tributaries by Ohio EPA.
- Development, with local area high schools, of education and monitoring programs.
- Completion of a 5-year upgrade to the Perrysburg wastewater treatment plant (WWTP), doubling its treatment capacity.
- Education of local land users on pollution prevention methods for nonpoint source pollution by U.S. EPA, Ohio EPA, Ohio Department of Natural Resources (ODNR), and Natural Resources Conservation Service (NRCS).

Joint development of a long-term dredged materials management plan among U.S. Army Corps of Engineers, Ohio EPA, City of Toledo, U.S. EPA, Toledo Port Authority, ODNR, U.S. Fish and Wildlife Service, and NRCS.

Future actions planned for this area include:

- Upgrade various municipal WWTPs at an expense of $27 million.

Lower Mississippi Alluvial Valley Wetland Conservation Plan

Size and location: 1120-kilometer (700-mile) stretch from Cairo, Illinois, south to the Gulf of Mexico; historical alluvial plain of the Mississippi River.

Nature of EPA involvement: Currently, providing funding assistance to multiple state agencies within the Lower Mississippi Valley, as well as federal interagency projects addressing forestry and resource planning issues. EPA and several regional sponsors will be coordinating the development of a regional wetlands conservation plan.

Organizations that initiated project: Multiple federal agencies, including EPA, U.S. Geological Survey (USGS), National Biological Survey (NBS), Natural Resources Conservation Service (NRCS) and U.S. Fish and Wildlife Service (FWS) are initiating ecosystem-scale planning and research efforts in the region.

Major environmental problems:

- Nonpoint source pollution in surface waters
- Extensive forested wetlands loss
- Impacted fisheries and wildlife habitats
- Extensive hydrological modifications

Actions taken or proposed: This multistate, multiregion initiative focuses on wetland restoration/reforestation and reduction of nonpoint source water pollution throughout the Lower Mississippi River Alluvial Plain. A regional sponsor will coordinate state and federal efforts by developing and implementing a regional wetlands conservation plan. Establishing networks among interest groups and data sharing through the use of a geographic information system will be emphasized, as well as prioritization of wetland restoration/acquisition sites.

Stakeholders:

Natural resource state agencies from MS, LA, TN, AR, KY, MO, and IL, agricultural community, forestry community, landowners, hunting and outdoor recreation groups, environmental organizations, sustainable economy organizations, federal natural resource and public health agencies, including EPA, National Biological Survey, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, U.S. Geological Service, U.S. Forest Service, Agency for Toxic Substances and Disease Registry (ATSDR).

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Milwaukee Estuary Area of Concern

Size and location: The Milwaukee Estuary Area of Concern (AOC) is in the City of Milwaukee. It includes the nearshore waters of Lake Michigan, Milwaukee Harbor, and portions of the Milwaukee, Menomonee, and Kinnickinnic rivers. Twenty-two square miles of land drain directly to the AOC. This 57-square-kilometer (22-square-mile) drainage area covers less than 3 percent of all the land draining to the estuary. (The AOC encompasses only a small portion of the entire watershed.)

Nature of EPA involvement: EPA provides funding for the Milwaukee Estuary Area of Concern and also participates in its advisory committee.

Organization that initiated project:

Wisconsin Department of Natural Resources

Major environmental problems:

- Degraded fish and wildlife habitat
- Degraded benthos, plankton, fish, and wildlife communities
- Eutrophication
- Tumors and other deformities in fish
- Beach closings and other restrictions on full-body contact with surface waters
- Combined sewer overflows
- Contaminated sediments
- Hydromodification
- Storm water runoff
- Sewage treatment plant effluent
- Industrial process and noncontact cooling water discharges

Actions taken or proposed: The Milwaukee Estuary AOC is one of 43 AOCs that have been designated by the International Joint Commission (a U.S.-Canadian commission) in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. The Wisconsin Department of Natural Resources (WDNR) completed Stage I of the RAP, which describes the nature and extent of problems, in March 1991. In July 1994, the WDNR released a report describing progress on the identification and implementation of remedial actions.

The WDNR has designated all six of the watersheds that are tributaries to the AOC as priority watersheds under the state's Priority Watershed Program. Designation as such has led to development of nonpoint source pollution control plans for all six of the watersheds.

Development of the plans has enabled the implementation of practices that control discharges of pollutants from rural and urban sources. Nearly 150 rural landowners have signed agreements to share the $1.4 million cost to implement controls. In addition, 32 public and nonprofit organizations have initiated nonpoint source pollution control programs in urban areas. Through mid-1993, the WDNR and the 32 organizations spent $2 million to implement the programs.

The WDNR has allocated $4 million for implementation of the nonpoint source pollution controls in 1994. Implementation will reduce soil erosion from farmland, construction sites, and stream banks. It also will reduce the discharge of livestock waste and household hazardous waste to surface waters. Structural controls established in urban environments will reduce pollutant loads from storm water runoff and mitigate the adverse hydrologic effects of impervious surfaces.

EPA is overseeing the design of a remedial action for the Moss-American Superfund site. The site, located in the City of Milwaukee, was used for several decades to treat railroad ties with a creosote and fuel oil mixture. An investigation of the site indicated the presence of several organic compounds in ground water, soil, and Lower Menomoinee River sediment. Among the compounds, polycyclic aromatic hydrocarbons (PAHs) were the most prevalent. They were found at concentrations known to promote the formation of tumors in fish.

In 1973, EPA funded the removal and treatment of contaminated sediments from a 1524-meter (5,000-foot) reach of the Little Menomonee River. Activities to be conducted as part of a full remedial action will involve relocation of the Little Menomonee River, removal and treatment of contaminated soil and sediment,

- Correct CSOs at an estimated investment of $420 million.
- Abate agricultural and urban nonpoint sources.
- Address contaminated sediment problems in Swan Creek, Ottawa River, and Maumee River.
- Preserve Maumee Bay from further filling.
- Preserve and restore lost wetlands.
- Conduct river investigations to document impacts on the environment and potential problems associated with landfill runoff.
- Complete Stage II RAP.

Stakeholders:

Local residents
Natural Resources Conservation Service
Ohio Department of Natural Resources
Ohio Environmental Protection Agency
Toledo Metropolitan Area Council of Governments
Toledo Port Authority
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Mississippi River Gateway Project

Size and location: The project area encompasses three counties in Illinois (Madison and St. Clair) and Missouri (St. Louis). The project focuses mainly on the western portions of Madison and St. Clair Counties of Illinois at the present time.

Nature of EPA involvement: EPA has been involved with the local community as well as with federal, state, and local agencies to address the human health and environmental problems associated with hazardous and solid wastes, flooding, chemical disposal, and lead contamination in the community. These problems are being addressed through pollution prevention efforts, cleanup of trash and waste associated with the lack of garbage pick-up, and compliance assistance/enforcement programs. Concerns related to environmental justice are being addressed by working with the local community leaders. EPA is also initiating efforts with local environmental groups to begin restoring lost or degraded habitats and providing environmental education.

Organization that initiated project: This effort was begun by EPA Region V but is supported by EPA Region VII, the U.S. Department of Housing and Urban Development, the Illinois Environmental Protection Agency, the Missouri Department of Health, and the Illinois Department of Public Health.

Major environmental problems: The major environmental problems are listed above. Some of these are related to the economic situation of the community. East St. Louis, Illinois, had lost much of its tax base and was unable to provide some of the basic services to its residents, e.g., garbage pickup, adequate wastewater treatment, safe housing, etc. By working with the other agencies, EPA has begun to address the community's needs.

Actions taken or proposed: Pollution prevention activities have begun to be implemented in the Greater St. Louis area to achieve reductions in pollutants of greatest risk. For instance, an effort has been undertaken to reduce human exposure to environmental and household lead. EPA is in the process of determining whether minority or low-income populations in the initiative area are disproportionatly exposed to hazardous waste, hazardous substances or other hazardous activities. EPA is working to develop a community-based public involvement program that encourages dialogue among governments, industry, community groups, and others. EPA is also developing a program to address the issue of lost and degraded habitats and the use of high quality habitats in environmental education.

Stakeholders: Illinois Environmental Protection Agency, Illinois Department of Public Health, Missouri Department of Health, U.S. Department of Housing and Urban Development, EPA Regions V and VII, local community groups and local industry. EPA expects that as the initiative grows, additional agencies will assist in this project.

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collection and treatment of contaminated ground water, and isolation of untreated soil and sediment. The remedial action is expected to take up to 4 years to implement at a cost of $26 million. It is scheduled to begin in 1997. When complete, the remedial action is expected to reduce releases of organic compounds to the Lower Menomonee River and the AOC.

In 1996, local governments will complete a $2.2 billion effort to reduce the frequency of overflows from combined sewers and improve the quality of effluent from the Milwaukee Metropolitan Sewerage District's (MMSD) two wastewater treatment plants. This effort involves significant improvement to existing sewers, the construction of tunnels to store wet-weather flows for subsequent treatment, and expansion of the MMSD's two wastewater treatment plants. Reduction in the number of overflow events and improvement in treatment plant effluent will significantly reduce the discharge of oxygen-consuming matter, solids, pathogens, and toxic substances to the AOC.

Recently funded projects include:

- Milwaukee Metropolitan Sewerage District's 1-day clean sweeps: an interim effort to collect household hazardous wastes until a permanent storage facility becomes operational (potentially in 1996).
- Milwaukee Estuary Sediment GIS Development: The University of Wisconsin-Milwaukee is preparing a study to provide a visual representation of the sediment characteristics in the AOC.
- North Avenue Dam Impoundment Restoration: This project will help to stabilize exposed sediment, restore stream banks, and enhance fish and wildlife habitat.
- Milwaukee River PCB Mass Balance: This study will help to pinpoint major sources of PCBs in the watershed.

Future actions that are planned for the AOC include:

- Implement programs and practices to control urban and rural nonpoint sources of pollution.
- Control pollutants discharged from the Milwaukee storm sewer system.
- Remediate the Moss-American Superfund site.
- Characterize sediments in streams that are tributaries of the AOC (e.g., Lincoln and Cedar creeks, Milwaukee River) and control releases of associated contaminants.
- Characterize sediments in the AOC and implement actions to minimize the adverse effects of associated contaminants.
- Restore stream banks and create vegetative buffer zones.
- Aerate a portion of the Menomonee River.
- Establish a household hazardous waste collection facility.
- Minimize the introduction of pollutants to sewers and surface waters through public education.

Stakeholders:

Citizens Advisory Committee
City of Milwaukee
Milwaukee County
Milwaukee Metropolitan Sewerage District
Milwaukee Estuary Area of Concern
Milwaukee River Revitalization Council
Southeast Wisconsin Regional Planning Commission
Technical Advisory Committee
U.S. Environmental Protection Agency
Wisconsin Department of Natural Resources

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Northwest Indiana Environmental Initiative

Stakeholders:

Citizens' Advisory for Remediation of the Environment (CARE) Committee
Indiana Department of Environmental Management
Indiana Department of Natural Resources
Industries
Local environmental groups
Local municipalities
Property owners
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Unions

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Northwest Indiana Environmental Initiative

Size and location: The Northwest Indiana Environmental Initiative centers on the Grand Calumet River watershed, approximately 24 kilometers (15 miles) southest of Chicago and encompasses parts of Lake and Porter Counties in northwest Indiana. Municipalities include the City of Hammond, the City of East Chicago, the City of Gary, and the City of Whiting.

Nature of EPA involvement: Through a comparative risk analysis, EPA Region V determined this area to have the greatest risk to human health and the environment in the region. Following the analysis, EPA launched the Northwest Indiana Environmental Initiative, of which the Grand Calumet River/Indiana Harbor Canal (GCR/IHC) Area of Concern (AOC) is a major part.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Historically low compliance with federal and state environmental statutes
- Four to eight million cubic meters (five to ten million cubic yards) of contaminated river and harbor sediments (pollutants include chromium, lead, and polychlorinated biphenyls (PCBs)
- Toxics
- Five Superfund sites
- Ground water contaminated with 57 to 114 million liters (15 to 30 million gallons) of free-phase hydrocarbons
- Municipal and industrial discharges
- Combined sewer overflows
- Contaminated ground water
- Storm water runoff

Actions taken or proposed: EPA is working closely with the Indiana Department of Environmental Management (IDEM) on a watershed basis in northwest Indiana. EPA and IDEM have developed a strategy for the area and have federal and state workgroups implementing this strategy. EPA actions include a Memorandum of Understanding with the U.S. Army Corps of Engineers to develop a sediment dredging project, targeted enforcement against watershed noncompliers, pollution prevention projects and workshops, multimedia site evaluations and cleanups, natural resource damage assessments, and an area ground water workgroup developing a map of the extensive ground water contamination.

Because of water quality problems and other threats to human health and the environment, EPA and IDEM have focused the Initiative on the Grand Calumet River/Indiana Harbor (GCR/IHC) Area of Concern (AOC). The GCR/IHC AOC is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC. The RAP will provide EPA and IDEM with a long-term course of action for environmental cleanup for the Grand Calumet River and Indiana Harbor. The RAP is addressing controlling nonpoint sources of pollution, remediating contaminated sediments, and restoring habitat.

The Initiative's successes include court-enforceable agreements with facilities at the head of the Grand Calumet to clean up wastewater discharges to meet permitted limits and remediate contaminated sediments in an 8-kilometer stretch of the river. The agencies secured a $55 million agreement covering cleanup, process improvements, and sediment remediation with a facility adjacent to the Indiana Harbor Canal. In August 1994, the agencies entered into a ground-breaking voluntary agreement with five northwest Indiana companies to control the migration of oil floating on top of the ground water.

Through the Initiative, the agencies will continue to ensure compliance with all federal and state environmental statutes. The agencies will also be working to see that Ambient Air Quality Standards for the area are achieved and that methods of pollution prevention are promoted to local industry and municipal treatment facilities. The Initiative will direct special attention to efforts necessary for the dredging of the Indiana Harbor Canal and the safe disposal/treatment of sediments. EPA has been working with the U.S. Army Corps of Engineers on a draft Environmental Impact Statement required for the dredging of the canal.

Saginaw Bay Urban Targeting Project

Size and location: Bay City, Michigan

Nature of EPA involvement: This project will demonstrate the use of geographic information systems (GIS) to develop and implement urban storm water management practices, as well as develop a model urban storm water management plan.

Organization that initiated project:

EPA Region V, GIS Management and Water Offices

Major environmental problems: Urban runoff is a major concern in most urban and suburban areas because of its potential to deliver pollutants to nearby resource areas. The challenge in urban areas is to determine effective management plans to prevent or reduce impacts of urban pollution.

Actions taken or proposed:

- Data base development - collection, preparation, and assembly of digital data layers for Bay City, MI required by model (Source Loading and Management Model (SLAMM)).
- Integration of SLAMM with applicable data layers.
- Identification of urban stormsheds and loading rates for Bay City and recommendation for management strategies.
- Final report on process, model, and techniques used in implementing the project.

Stakeholders:

There are several ongoing efforts supported by state and federal funds that address pollutant loading to Saginaw Bay and its tributaries. These projects involve working with municipalities to review current land management practices, storm water permitting programs, and nonpoint source program implementation.

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Saginaw Bay

Size and location: The Saginaw Bay watershed encompasses over 20,700 square kilometers (8000 square miles) and is located on the northwestern side of Lake Huron in Michigan. The watershed completely surrounds the Saginaw Bay itself. Several large tributaries, including the Saginaw River, Cass River, Flint River, Shiawasee River, and Tittabawasee River, provide a source of freshwater to the bay. Within the watershed lie the jurisdictions of 22 counties and numerous townships.

Nature of EPA involvement: EPA provides funding for the Saginaw Bay Area of Concern and also participates in its advisory committee.

Organizations that initiated project:

Michigan Department of Natural Resources
U.S. EPA

Major environmental problems:

- Fish consumption advisories due to contamination with polychorinated biphenyls (PCBs)
- Eutrophication due to nutrient enrichment
- Widespread destruction of aquatic habitat from sediment
- Alteration of aquatic and terrestrial habitat from altered watershed hydrology

Actions taken or proposed: Saginaw Bay is one of 43 Areas of Concern (AOC) that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. In 1987, the State of Michigan developed a Remedial Action Plan (RAP) that provides a long-term course of action for environmental cleanup of the Saginaw River and Bay. Through the RAP process and the Saginaw Bay National Watershed Initiative, the State of Michigan, along with other partners, has identified priority activities to be undertaken to restore and protect the Saginaw Bay watershed. The overall goal for the watershed is to "develop a comprehensive water quality/resource management effort utilizing the resources of federal, state, and local units of government, as well as interested organizations and citizens, to identify water quality/resource management issues impacting the use or quality of natural resources in the watershed and to implement actions to restore and protect the Saginaw Bay watershed."

Recent activities to support the goals include:

- Monitoring in the bay and tributaries.
- Prioritization of sediment delivery and erosion areas.
- An aggressive public education campaign.
- Wetland restoration efforts to support wildlife habitat.
- Implementation of urban and agricultural best management practices to prevent erosion.

Stakeholders:

Dow Corning Corporation
Michigan Association of Conservation Districts
Michigan Department of Agriculture
Michigan Department of Natural Resources
Michigan Department of Public Health
Michigan Farm Bureau
Michigan State University
National Oceanic and Atmospheric Administration
Natural Resources Conservation Service
Saginaw Basin Alliance
Saginaw Bay Watershed Council
Saginaw Valley State University
U.S. Army Corps of Engineers
U.S. Cooperative Extension Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
University of Michigan

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Southeast Chicago Urban Environmental Initiative

Size and location: The Southeast Chicago area is a 168-square-kilometer (65-square-mile) area of the industrial southeast portion of Chicago and adjacent suburbs. This area was chosen because of its concentration of severe environmental problems, dense population, and environmental justice concerns. Approximately 400,000 people live in this area.

Nature of EPA involvement: EPA is working on several fronts to address environmental problems within the community. Through the Environmental Equity Office, EPA is working with the community on Lead Abatement Training. A joint project between EPA and HUD on sustainable development is being initiated. The goal of this program is to address sustainable development of communities in economically and socially disadvantaged neighborhoods. Pollution prevention is being implemented in the community through a grant with the Universities of Illinois and Michigan.

Organization that initiated project:
U.S. EPA

Major environmental problems: The area was heavily industrialized and is littered with many abandoned plants and factories. There are also several waste disposal facilities in the designated area, and there are many sites where "midnight dumping" has occurred. A variety of studies have identified the Southeast Chicago area as an area subject to potentially high health risks from exposure to environmental contaminants. One study documented in a September 1989 report entitled *Estimation and Evaluation of Cancer Risks Attributed to Air Pollution in Southeast Chicago* identified subareas with particularly high risks, and identified that the greatest portion of these risk came from coke ovens. However, scattered throughout the area are several small but high-quality pieces of habitat.

Actions taken or proposed: A coalition of government agencies has been established to address environmental problems in the area. Over the next one to two years, the coalition will focus on six specific areas: lead, "Brownfields," "Fly Dumping," natural resources, enforcement, and public outreach/education.

As indicated above EPA has begun an environmental education program on lead abatement within the community. The actions with HUD and the Chicago Housing Authority are being implemented in public housing at a demonstration project. Pollution prevention by industries in the initiative is being implemented through the educational program developed by the Universities of Illinois and Michigan.

The Agency for Toxic Substances and Disease Registry (ATSDR) has completed free medical screening for residents of the Altgeld Gardens area. EPA, ATSDR and the Illinois Department of Public Health (IDPH) in May of 1994, began testing the ambient air and indoor air in Southeast Chicago for metals, volatile organic compounds and semi-volatiles. This data will be used by ATSDR to complete a health assessment of the area. Actions plans are being developed for lead, "Brownfields," "Fly Dumping," natural resources, enforcement and public outreach. An Environmental Justice Pilot Project is planned for the Summer of 1995. The primary objective of the pilot project is to familiarize teachers in Southeast Chicago with environmental issues.

Stakeholders:
Agency for Toxic Substances and Disease Registry
Cook County Department of Environmental Control
City of Chicago Departments of Health and the Environment
Illinois Environmental Protection Agency
Illinois Department of Public Health
Metropolitan Water Reclamation District of Greater Chicago
Office of Illinois Attorney General
U.S. EPA

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St. Mary's River

Size and location: The St. Mary's River forms one of the borders between the United States and Canada. It is also a connecting channel between Lake Superior and Lake Huron. It is located in Chippewa County in Michigan's Upper Peninsula.

Nature of EPA involvement: EPA provides funding for the St. Mary's River Area of Concern and also participates on its advisory committee.

Organizations that initiated project:

Ontario Ministry of Environment and Energy
Michigan Department of Natural Resources
U.S. EPA

Major environmental problems:

- Pollutant discharges from paper and steel industries
- Discharges from publicly owned treatment works
- Superfund site—Cannelton Site, former tannery
- Contaminated sediments
- Flow diversions for navigation and power generation
- Habitat loss/change

Actions taken or proposed: The St. Mary's River Area of Concern (AOC) is one of 43 AOCs that have been designated by the U.S. and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. Stage I of the RAP, which identified use impairments, their causes, and sources, was completed in March 1992, and Stage II development is under way. Stage II focuses on identifying remedial actions and their methods of implementation.

Activities already under way include:

- Sewer separation in the City of Sault Ste. Marie, Michigan.
- Improved treatment by Algoma Steel to enhance removal of oil and grease.
- Various monitoring and assessment efforts.
- Superfund remediation work at the Cannelton site.
- Several pilot-scale in situ sediment remediation projects on the Canadian side of the River to evaluate various remediation options (completed).

Full-scale sediment remediation is also planned.

Stakeholders:

Environment Canada
Michigan Department of Natural Resources
Ontario Ministry of Natural Resources
Ontario Ministry of the Environment and Energy lead)
U.S. and Canadian citizens (Binational Public Advisory Committee)
U.S. Environmental Protection Agency

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Tri-State Initiative

Size and location: Covering 600,000 hectares (1.5 million acres) and including 368,000 people, the Tri-State Initiative is located where the states of Ohio, West Virginia and Kentucky meet and includes the counties of Boyd and Greenup (Kentucky), Lawrence and Scioto (Ohio), and Wayne and Cabell (West Virginia).

Nature of EPA involvement: To assist in a collective effort to define, remediate and prevent environmental threats in the tri-state area.

Organization that initiated the project:
U.S. EPA

Major environmental problems: This area was selected because of the following high risk/priority indicators: pollutants released into the environment; known/suspected environmental problems; local meteorological conditions; and the level of public concern expressed to EPA.

Actions taken or proposed: The Air Quality, Risk Analysis, Pollution Prevention, Geographic Information System (GIS) and Public Relations workgroups are currently working on the following projects: Industry and Community Discussions, Risk Screening/GIS Mapping, Air Toxics Study, Pollution Prevention and a Surface Water Study. Teams on the inactive status include Groundwater, Waste, and Compliance.

Stakeholders:
- Agency for Toxic Substances and Disease Registry
- EPA Regions III, IV and V
- Kentucky Department of Environmental Protection
- Kentucky Partners
- Ohio Environmental Protection Agency
- Ohio River Valley Sanitation Commission
- Portsmouth Local Air Quality Agency
- West Virginia Division of Environmental Protection

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Southeast Michigan Initiative

Size and location: The Southeast Michigan Initiative (SEMI) covers eight counties in and around the Detroit, Michigan, metropolitan area and includes five Areas of Concern (AOCs) designated under the Great Lakes Water Quality Agreement. The five AOC watersheds are Clinton River, River Rouge, Detroit River, River Raisin, and St. Claire River. The counties in the initiative area include St. Clair, Macomb, Oakland, Livingston, Washtenaw, Wayne, Lenawee, and Monroe.

Nature of EPA involvement: EPA works in partnership with other agencies on SEMI, providing staff support and funding.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Combined sewer overflow
- Nonpoint source pollution
- Sediment contamination
- Urban air pollution

Actions taken or proposed: SEMI is a partnership formed among the Michigan Department of Natural Resources (MDNR), EPA, and other state and local agencies to focus resources in eight counties in the Detroit metropolitan area. This partnership was prompted by the recognition that environmental problems might be better addressed through a more coordinated effort and that they need not be addressed solely by regulatory solutions. It was also recognized that a geographical, cross-media, ecosystem, and/or holistic solution might be required for their resolution.

The agencies' base programs will be key tools in this effort. Consequently, intense discussions have been initiated between EPA and MDNR. Examples of issues under discussion include remediation of industrial waste in landfill along the banks of the Rouge River and remediation of a sediment polychlorinated biphenyl (PCB) "hot spot" on the Raisin River. The goal, in general, is to better use the permitting, enforcement, and planning processes to further environmental work.

During 1994, SEMI will develop innovative programs on pollution prevention, Remedial Action Plans and sediments, public participation (including risk communication), and compliance and enforcement. Several projects already initiated include an industrial pretreatment pollution prevention program for publicly owned treatment works, the development of an industrial pollution prevention network, an environmental justice study, and a survey of neighborhood environmental problems. In addition, major resources have been allocated for contaminated sediment characterization and remediation.

One project in the SEMI area of particular note is the Rouge River Wet Weather Demonstration Project. The project, which is funded through $128 million in federal grants, is designed to investigate sources of water pollution in a highly urbanized watershed during wet-weather events and to demonstrate methods for their control. Additional funds totalling $160 million have been appropriated for this project.

Stakeholders:

Academic institutions
Citizen and technical advisory groups for each of the five Areas of Concern
City of Detroit
Civil Rights groups
County governments, health departments, and health providers
Environmental groups
Interested citizens
Michigan Department of Natural Resources
Regulated community
Southeast Michigan Council of Governments
U.S. Environmental Protection Agency

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Region VI Projects

Example projects submitted by Region VI include the 11 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on river basins, bays/estuaries, and lakes. Other projects focus on environmental issues in the international boundary zone with Mexico, long-term ecological research in arid lands, and ground water. Erosion of barrier islands and coastal wetlands, degradation of estuarine habitats, endangered species issues, declining seafood harvests, agricultural wastes and runoff, rangeland impacts, ground water flow and contamination, urban nonpoint sources, and conversion of bottomland hardwoods to agriculture are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives occurring in or extending into the Region, which include the Lower Mississippi Delta Initiative, the Gulf of Mexico Program, the Rio Grande/Rio Bravo Watersheds Project, the Great Plains Initiative, the Colorado Plateau Ecosystem Partnership Project, the Colorado River Program, and the Rio Grande Basin Landscape-Scale Assessment.

Region VI projects in the Inventory at this time include:

Arbuckle-Simpson Aquifer Project, OK
Barataria-Terrebonne Estuary, LA
Corpus Christi Bay, TX
Galveston Bay Estuary, TX
Illinois River - Battle Branch, OK
Jornada Long-Term Ecosystem Research Project, NM
Lake Pontchartrain Basin, LA
Lake Worth, TX
Lower Mississippi Alluvial Valley Wetland Conservation Plan, IL, LA, MS, AR, KY, TN, MO*
Tangipahoa River, LA
Tensas River Basin Initiative, LA

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Arbuckle-Simpson Aquifer Project

Size and location: The aquifer covers an area of 1300 square kilometers (500 square miles) in the State of Oklahoma.

Nature of EPA involvement: Interagency Agreement, U.S. Geological Survey (USGS), Oklahoma City, Principal Investigator Mark Savoca, 02/01/93-01/31/96, $104,660. Project Officer: Stephen Kraemer, USEPA/ORD/RSKERL-Ada. The Project Officer has an In-house Research Project supporting this effort, including an on-site contractor work assignment.

Organization that initiated project:

U.S. Geological Survey, Oklahoma District

Major environmental problems: The Arbuckle-Simpson is a U.S. EPA Region VI Sole Source Aquifer. The fractured rock aquifer has fresh water to a depth of over 610 meters (2000 feet). Although relatively undeveloped, there are critical ecosystems and springs in the area that are threatened by human actions. A significant trend of decreased discharge from springs within the Chickasaw National Recreation Area has been recorded since 1906, possibly due to over-pumping. The city of Ada relies on Byrds Mill Spring for 100 percent of its water supply, and historic droughts have reduced the discharge to zero.

Actions taken or proposed: A field reconnaissance and modeling project has been initiated with the USGS. Abandoned oil wells are being used as windows into the subsurface. The holes are being logged and hydraulically tested, and water quality samples are being dated so that residence times can be estimated. A synoptic survey of spring discharges and static water levels in wells is planned for FY95. A regional-scale water budget model is proposed.

Stakeholders:

State of Oklahoma Water Resources Board
U.S. EPA
USGS
National Park Service (Chickasaw National Recreation Area)
Municipalities and citizens within the aquifer area

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Barataria-Terrebonne Estuary

Size and location: The Barataria-Terrebonne Estuary consists of adjacent basins that cover more than 1.6 million hectares (4 million acres) of south-central Louisiana, between the Mississippi River and the Atchfalaya River. Parts or all of 15 parishes are included in the study area.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in various committees in the program.

Organizations that initiated project:

State of Louisiana/Department of Environmental Quality
U.S. Environmental Protection Agency

Major environmental problems:

- Loss of more than 1700 square kilometers (656 square miles) of productive wetlands and barrier islands
- Hydrological modification
- Loss of sediments
- Habitat loss/modification
- Changes in living resources

Actions taken or proposed: Barataria-Terrebonne Estuary was selected for inclusion in the National Estuary Program in 1990. A Comprehensive Conservation and Management Plan (CCMP) is being developed by a coalition of affected agencies, industries, and other organizations to identify detailed remedial action plans.

In order to assess future environmental conditions in the estuarine system, and to evaluate potential management measures, the program will use two state-of-the-art predictive models. Although the two models address different parameters, hydrologic alteration and landscape change, they are being developed in close coordination with one another. This coordination is essential because the hydrology of the system greatly affects the rate and timing of habitat change.

Other activities/studies include:

- Working with the Federal Emergency Management Agency to determine the extent of environmental damage caused by Hurricane Andrew on the Barataria-Terrebonne estuary system, and to develop plans to minimize future impacts.
- Mapping the oyster-producing areas within the system. This will assist in evaluating how the oyster fishery is influenced by environmental changes within the estuaries.
- Survey of vegetative damage caused by nutria herbivory in the watersheds. This will provide information regarding the distribution of damaged areas, species of vegetation being impacted, and status of recovery of damaged areas.
- Locating, characterizing, and mapping storm water drainage stations withinn the system. By focusing on storm water runoff discharge and its potential contribution to elevated levels of fecal coliform bacteria in areas that support recreation and shellfish, it will assist in developing a storm water management strategy.
- Measuring the input and distribution of suspended sediments and other aquatic parameters in the western Terrebonne marshes, and determining the system's response to those inputs. This involves determining the distribution of selected water column parameters, and how their distribution relates to forcing functions such as tide and river discharge.
- Developing a Wetlands Workshop to increase public awareness regarding environmental problems and issues facing Louisiana's coast.
- Producing a high-quality video focusing on residential sewage treatment systems, and development of support materials. This will educate the public regarding the importance of maintaining or installing a treatment system.

Stakeholders:

Educational institutions
Federal government agencies

Industries and businesses
Local citizens
Local government agencies
Regional planning agencies
Scientific community
State government agencies
Various user groups

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Corpus Christi Bay

Size and location: The Corpus Christi Bay National Estuary Program (CCBNEP) encompasses the estuarine environment of 120 kilometers (75 miles) of the south-central Texas coastline and the 12 member counties of the Coastal Bend Council of Governments. This 1425-square-kilometer (550-square-mile) area includes all bays and saltwater bayous in the Arkansas, Corpus Christi, Baffin, and upper Laguna Madre Bay systems.

Nature of EPA involvement: EPA provides 75 percent funding for the program and also provides technical and program guidance. This support includes a full-time coordinator and participation in the program's policy, management, and technical committees.

Organizations that initiated project:

Office of the Governor of Texas
Texas Natural Resource Conservation Commission
U.S. Environmental Protection Agency

Major environmental problems:

- Limited freshwater inflows to the Corpus Christi Bay system
- Loss of wetlands, seagrasses, and other critical habitats
- Altered estuarine circulation
- Negative impacts from dredging and the disposal of dredged materials
- Impacts of persistent brown tide
- Degradation of water quality in the estuaries and their tributaries from point and nonpoint sources of pollution
- Endangered species issues: whooping crane, piping plover, and Kemp's Ridley sea turtle

Actions taken or proposed: Corpus Christi Bay was selected for inclusion in the National Estuary Program in 1992. A Comprehensive Conservation and Management Plan (CCMP) is being developed for Corpus Christi Bay that recommends actions to protect and enhance the water quality and living resources of the bay.

The CCMP will outline specific actions, schedules, and budgets to remediate those problems identified by the CCBNEP. The actions will be developed using a consensus-based approach involving all possible affected parties. The CCMP will be a truly comprehensive plan including commitments and plans for financing, implementing, and monitoring priority management actions.

Stakeholders:

Agricultural interests
Business and industry representatives
Citizens' groups
Federal agencies
Local agencies and governments
Local citizens
State agencies
Universities

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Galveston Bay Estuary

Size and location: Galveston Bay Estuary is located near Houston, Texas, and empties into the Gulf of Mexico. The estuary itself covers 1550 square kilometers (600 square miles) and has a watershed that encompasses 82,880 square kilometers (32,000 square miles).

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding, and technical and programmatic support and has participated in various committees in the program.

Organization that initiated project:

Texas Natural Resource Conservation Commission (formerly Texas Water Commission)

Major environmental problems:

- Wetland loss
- Nonpoint source pollution
- Sewer overflows/bypasses
- Possible future alterations of freshwater inflow
- Aquatic toxicity
- Living resources declines
- Poor shoreline management practices
- Oil and chemical spills
- Bioaccumulation of toxics in seafood
- Illegal connections to storm sewers
- Low dissolved oxygen
- Oyster bed closures
- Poor water and sediment quality in marinas
- Shoreline erosion
- Bay debris
- Risks of contact recreation due to pathogens
- Exotic species

Actions taken or proposed: Galveston Bay Estuary was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan (CCMP) is being developed for Galveston Bay that recommends priority corrective actions to restore and maintain the estuarine resources. Costs for implementation of the CCMP are projected to be about $36.5 million.

Actions that have been taken in the bay include:

- Designation of two State Coastal Preserves.
- Proposed designation of Christmas Bay as an Outstanding National Resource Water under the state's water quality standards.
- Restored shoreline vegetation in several areas.
- Conducted industrial pollution prevention activities.
- Built a 2-hectare (5-acre) oyster reef using artificial substrate.
- Increased use of pump-outs by recreational boaters through an intensive education effort.
- Implemented a continually expanding citizen monitoring program.
- Implemented a Citizens' Pollution Reporting Hotline.
- Developed a seafood consumption safety program.

Some of the most important actions that have yet to be taken but that have been proposed in the development of the CCMP include:

- Acquire and protect quality wetlands.
- Restore, create, and protect wetlands.
- Implement storm water control programs for local cities.
- Establish residential load reduction programs.
- Correct malfunctioning septic tanks.
- Eliminate or reduce bypass and overflow problems.
- Issue National Pollutant Discharge Elimination System permit for control of oil and gas discharges.
- Establish sediment quality criteria.
- Determine total maximum daily load for oxygen demand and nutrients.
- Reduce nutrient and biological oxygen demand loadings to problem areas.
- Establish a planning program for shoreline development.
- Reduce water consumption.
- Implement a baywide effort to strengthen species management.

Galveston Bay Estuary

A unique feature of the Galveston Bay program was the use of contingent valuation to determine an estimated value for the resource.

Stakeholders:

Business and commerce
Commercial fishing
Environmental groups
Federal agencies
Local citizens
Local governments
Local industries
Recreational fishing
State government agencies

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Illinois River - Battle Branch

Size and location: The Battle Branch watershed is a subwatershed within the Illinois River basin. It contains approximately 14,500 hectares (36,000 acres) and is located in Delaware County, Oklahoma.

Nature of EPA involvement: EPA provided financial assistance through Clean Water Act section 319(h) funds, to support the demonstration of best management practices (BMPs) and monitoring to evaluate the effectiveness of the BMPs implemented.

Organization that initiated project:

Cherokee Hills Resource Conservation District

Major environmental problems: Nutrient pollution from a variety of sources including:

- Inadequate rural wastewater systems
- Disposal of other domestic refuse
- Undesirable techniques for disposal of dead poultry or other animals
- Livestock holding areas and lagoons associated with dairy operations
- Excessive application of poultry litter and other animal wastes to agricultural pasture lands (more than 22,000 metric tons (24,200 tons) of poultry and dairy waste per year)

Actions taken or proposed:

This project was divided into four major components:

(1) Install best management practices (BMPs) using structural or vegetative measures suited to a program of landowner cost-sharing.

(2) Support development of animal waste plans through technical and/or financial assistance to landowners. Promote voluntary landowner adoption of such plans.

(3) Conduct regular monitoring to document the effectiveness of installed BMP measures in improving water quality.

(4) Use information learned from Battle Branch project to facilitate the transfer of effective BMP approaches to other small watershed units within the Illinois River basin.

The project manages nutrient sources on-site as thoroughly as possible through installation of water-quality-oriented BMPs. BMPs that used proper land application techniques and waste handling methods to reduce the amount of nutrients entering Battle Branch and its tributaries were developed. To date, approximately 84 percent of landowners in the Battle Branch watershed have signed up for participation in the project.

Implementation of BMPs in the Battle Branch watershed has significantly reduced nutrient concentrations. During runoff events, nitrate levels have decreased as much as 72 percent and total phosphorus levels have decreased as much as 35 percent. Further, it is projected that if similar reductions could be achieved in all creeks of the Illinois River basin, it would represent a significant reduction in nutrient loading to the Illinois River. Examples of implemented BMPs include:

- Conservation plans
- Waste management plans
- Rural wastewater systems
- Poultry composters
- Riparian tree planting
- Waste storage structures

Stakeholders:

Businesses
Government agencies
Local citizens
Special interest groups

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Jornada Long-Term Ecosystem Research Project

Size and location: The project is located on the U.S. Department of Agriculture (USDA) - Agricultural Research Service (ARS) Jornada Experimental Range and New Mexico State University Ranch. The total area of the two properties, located north of Las Cruces, Dona Ana County, New Mexico, is 195,360 hectares (483,560 acres).

Nature of EPA involvement: Collaborative research programs under the supervision of Dr. Walter G. Whitford (ST) Senior Research Ecologist, Environmental Monitoring Systems Laboratory-Las Vegas and Dr. Kris Havstad, Director, USDA-ARS Jornada Experimental Range.

Organization that initiated project:

U.S. EPA, Environmental Monitoring Systems Laboratory-Las Vegas, Nevada

Major environmental problems: This long-term experiment is designed to examine the effects of single and multiple stressors on rangeland ecosystem responses. Stressors examined in the experiment include grazing, drought, fire, and soil nutrient depletion. Main effects are shrub removal and grazing; split effects are drought, fire, and nutrient depletion. Ecosystem parameters measured in the study include vegetation composition, cover, and productivity; soil microarthropod populations; ant communities (species abundances); rodent species abundance, insect abundance; lizard species abundances; soil respiration; soil organic matter; size of erosion cells; soil depth; and soil bulk density.

Sensitivity of indicators of rangeland health is also a component of the experiment. Comparisons of indicators values on sites of known history of disturbance and change will be made. Indicators examined include vegetation composition and cover, soil stability, 14 parameters that provide measures of ecosystem capacity for conserving and retaining the essential resources (water and nutrients), and faunal indicators (relative abundances of breeding birds, wintering birds, and ants).

AVHRR imagery will be applied to classifying and assessing degradation of rangeland ecosystems. Sites with known histories of disturbance and change will be used to provide ground truth and calibration for AVHRR imagery, which uses differences in seasonal patterns of green-up of C3 and C4 species to classify vegetation and to rank sites in terms of vegetative cover.

Actions taken or proposed: A 5-year interagency agreement between the U.S. EPA and USDA-ARS is in place. The first year of research was completed on August 15, 1994. The multiple stressor experiment set-up is complete, and a complete set of baseline data has been gathered. One paper on AVHRR imagery is in review in Ecological Applications.

Stakeholders:

EPA's global climate change program
National Science Foundation - Long-Term Ecological Research Program
North American Free Trade Agreement Interests
USDA-ARS
U.S. Bureau of Land Management

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Lake Pontchartrain Basin

Size and location: Lake Pontchartrain and its adjacent lakes form one of the largest estuaries in the United States. Nearly 1.5 million people—one-third of the entire population of Louisiana—live in the 14 parishes of the Lake Pontchartrain Basin. The Lake Pontchartrain basin is a 12,170-square-kilometer (4,700-square-mile) watershed in southeastern Louisiana, stretching from the State of Mississippi on the north and east to the Mississippi River on the west and south, and to Breton Sound at the Gulf of Mexico.

Nature of EPA involvement: Cooperative agreements with the Lake Pontchartrain Basin Foundation (LPBF) and participation on the LPBF's Inter-Agency Working Group.

Organizations that initiated project:

Lake Pontchartrain Basin Foundation
U.S. Congress

Major environmental problems:

- Nonpoint source pollutants from sewage and farm animal wastes
- Saltwater intrusion
- Stormwater runoff
- Sewage from fishing camps and poorly sewered and nonsewered communities
- Habitat destruction from rapidly expanding urban development
- Commercial activities along the Inner Harbor Navigation Canal
- Loss of wetlands
- Dwindling grassbeds
- Diminished shellfish and fish harvests
- Closed beaches
- Occasional occurrence of oxygen-deficient areas ("dead zones") in the lake

Actions taken or proposed: A Comprehensive Management Plan that reflects a holistic watershed approach to solving the water quality problems has been developed for the Lake Pontchartrain basin. A number of projects are under way, including:

- A pilot storm water treatment effort (with created wetlands and retention ponds).
- A basinwide educational program.
- Continued construction and clean-out of no-discharge dairy waste lagoons in Tangipahoa Parish.
- A submerged aquatic vegetation restoration project.
- Citizens monitoring projects.
- A model ordinance project on the North Shore.

Stakeholders:

Businesses (industry, fishing, agriculture, others)
Government agencies (local, state, and federal, environmental, parks, recreation, land use, etc.)
Local citizens
Special interest groups (environmental, recreation, preservation, education, etc.)

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Lake Worth

Size and location: Lake Worth is located in north-central Texas. The lake covers approximately 20 hectares (50 acres) and has a watershed of 5346 square kilometers (2064 square miles).

Nature of EPA involvement: Award grant authority and project management under the Clean Lakes Program (section 314 of the Clean Water Act).

Organizations that initiated project:

Texas Natural Resource Conservation Commission
City of Fort Worth

Major environmental problems:

- Increasing eutrophication
- Algae blooms
- Sedimentation
- Agricultural (dairy farms) and mining (sand and gravel operations) impacts on lake water quality and aquatic habitat

Actions taken or proposed: Texas received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Lake Worth and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

In 1990, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to a lake. Several restoration activities are under way including:

- Construction of a pressurized sewage collection system to replace septic systems currently causing nonpoint source pollution around the lake.
- Removal of submerged stumps in the lake.
- Development of a comprehensive basin water quality management plan.
- Possible enhancement of an existing wetland to remove nutrient loading to the lake.

Stakeholders:

City of Fort Worth
Dairy owners
Local citizens
Natural Resources Conservation Service
Recreation industry
Sand and gravel mining operators
Tarrant County Water Control and Improvement District
Texas Natural Resource Conservation Commission
Trinity River Authority
U.S. Environmental Protection Agency

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Lower Mississippi Alluvial Valley Wetland Conservation Plan

Size and location: 1120-kilometer (700-mile) stretch from Cairo, Illinois south to the Gulf of Mexico; historical alluvial plain of the Mississippi River.

Nature of EPA involvement: Currently, providing funding assistance to multiple state agencies within the Lower Mississippi Valley, as well as federal interagency projects addressing forestry and resource planning issues. EPA and several regional sponsors will be coordinating the development of a regional wetlands conservation plan.

Organizations that initiated project: Multiple federal agencies, including EPA, U.S. Geological Survey (USGS), National Biological Survey (NBS), Natural Resources Conservation Service (NRCS) and U.S. Fish and Wildlife Service (FWS), are initiating ecosystem-scale planning and research efforts in the region.

Major environmental problems: Nonpoint source pollution in surface waters, extensive forested wetlands loss, impacted fisheries and wildlife habitats, extensive hydrological modifications.

Actions taken or proposed: This multistate, multiregion initiative focuses on wetland restoration/reforestation and reduction of nonpoint source water pollution throughout the Lower Mississippi River Alluvial Plain. A regional sponsor will coordinate state and federal efforts by developing and implementing a regional wetlands conservation plan. Establishing networks among interest groups and data sharing through the use of a geographic information system will be emphasized, as well as prioritization of wetland restoration/acquisition sites.

Stakeholders:

Natural resource state agencies from MS, LA, TN, AR, KY, MO, and IL, agricultural community, forestry community, landowners, hunting and outdoor recreation groups, environmental organizations, sustainable economy organizations, federal natural resource and public health agencies, including EPA, National Biological Survey, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, U.S. Geological Service, U.S. Forest Service Agency for Toxic Substances and Disease Registry (ATSDR).

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Tangipahoa River

Size and location: The Tangipahoa River watershed includes about 214,000 hectares (529,600 acres), of which 67 percent are in Louisiana, mostly located in Tangipahoa Parish.

Nature of EPA involvement: EPA provided financial assistance, through Clean Water Act section 106 and 319(h) funds, to support oversight of dairy lagoon construction, ground water monitoring to ensure the effectiveness of the lagoons, and demonstration of proper operation and maintenance practices.

Organization that initiated project:

Louisiana Department of Environmental Quality

Major environmental problems:

- Nutrient and sediment nonpoint source pollution
- Bacterial contamination
- Improperly functioning municipal wastewater treatment facilities
- Runoff from unsewered communities, trailer parks, and homes (lack of a septic system or septic tank failure)
- Runoff and discharges from dairies and other concentrated animal operations
- Runoff from truck farming, forest harvest areas, and roads

Actions taken or proposed: Louisiana has targeted the Tangipahoa River within its Nonpoint Source Management Program to reduce bacterial contamination. More specifically, the Louisiana Department of Environmental Quality (LDEQ) has three nonpoint source pollution control cooperative agreements (section 319(h) of the Clean Water Act) with EPA, which contain activities/projects within the Tangipahoa River watershed, to address bacterial and nonpoint source pollution.

LDEQ has implemented an educational program in the areas of Tangipahoa Parish that are listed in the Nonpoint Source Assessment Report as having septic tank problems. The purpose is to educate local people about how their individual wastewater problems contribute to bacterial contamination of the river.

LDEQ has been working with state and federal agricultural agencies on a project to implement Natural Resources Conservation Service (NRCS) designed no-discharge lagoon systems into the dairies that operate in Tangipahoa Parish. There are approximately 273 dairies in the parish, and approximately 225 have agreed to participate in either the NRCS or the Agricultural Stabilization and Conservation Service federal cost-share program for installation of the lagoons. Of the 225 dairymen who have agreed to participate in the federal cost-share program, approximately 93 lagoon systems have been installed. The purpose of these lagoons is to reduce bacterial and nutrient loading to the Tangipahoa River.

In addition to the federal cost-share program, the Louisiana State Legislature enacted a provision to establish a state cost-share program to assist the dairymen in meeting the installation costs of the lagoon systems. First-year funding for the state cost-share program was $350,000; the second-year funding for the program totaled $250,000. The state cost-share program has been successful, with approximately 80 dairymen participating.

LDEQ has implemented a series of five dairy demonstration field days to educate dairymen on how the solids in the lagoon systems need to be cleaned out every 2 to 4 years, if the systems are to continue to function as no-discharge systems. The demonstration included information on nutrient availability in the lagoon systems and how this translates to nitrogen and phosphorus values that can be applied to the dairymen's fields. The equipment that is used to pump solids from the lagoon system was available and functioning at the demonstration site, to show dairymen what was involved in pumping the lagoons and land-applying wastes to their fields. These demonstrations were well attended by more than 100 dairymen in Tangipahoa Parish.

The Department of Health and Hospitals has estimated a reduction of approximately 3.79 million liters (1 million gallons) a day of untreated sewage being discharged into the river, and the water quality data are beginning to show measurable declines in the

concentration of fecal coliform bacteria within the Tangipahoa River.

Stakeholders:

Businesses
Government agencies
Private citizens
Special interest groups

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Tensas River Basin Initiative

Size and location: The Tensas River flows approximately 504 kilometers (315 miles) through the upper northeast part of Louisiana, eventually emptying into the Red River. The Tensas River National Wildlife Refuge, established in 1980, consists of 26,260 hectares (65,000 acres) of extensive bottomland hardwood swamps. The Tensas River Basin Initiative is located in the upper Tensas watershed of Louisiana, a 303,000-hectare (750,000-acre) watershed in portions of East Carroll, Franklin, Madison, and Tensas Parishes.

Nature of EPA involvement: Section 104(b) and 319 grants were awarded to the Louisiana Department of Environmental Quality to document and implement a Tensas Model incorporating the Watershed Protection Approach, in addition to public outreach and geographic information system (GIS) documentation to support the overall effort.

The U.S. Department of Agriculture (USDA) and EPA's Corvallis Lab worked together to apply a synoptic assessment approach to identify potential wetland restoration sites in the Tensas River basin. Results will be used as a model for other watersheds within the Lower Mississippi Alluvial Plain ecosystem, including the Cache-White River basin in the Arkansas Delta.

Organizations that initiated project:

Northeast Delta Resource Conservation and Development Board
Louisiana Department of Environmental Quality
The Nature Conservancy

Major environmental problems:

- Historic conversion of bottomland hardwoods to agriculture, resulting in loss of wetlands
- Channelization and loss of riparian areas
- Water quality degradation
- Reduction in wildlife habitat and biodiversity
- Nonpoint source pollution
- Environmental justice (most impoverished area in the United States)
- Loss of flood control functions

Actions taken or proposed: The Louisiana Department of Environmental Quality (LADEQ) received a grant from EPA to develop a comprehensive watershed protection plan for the Tensas River, using a holistic approach. LADEQ has contracted with The Nature Conservancy to develop the watershed protection plan for the Tensas River Watershed. An additional EPA grant to the Natural Resources Conservation Service (NRCS) in Louisiana contributed to the development of a program-neutral River Basin Study. A Technical Steering Committee composed of representatives from various state and federal agencies, nonprofit and special interest groups, and local citizens, and chaired by the local Farm Bureau Representative, meets quarterly.

The Northeast Resource Conservation and Development Board, through funding from EPA, Natural Resources Conservation Service, and The Nature Conservancy, has hired a Watershed Manager to inform rural landowners of the project and to communicate between the participating partners (agencies) and the public. The U.S. Geological Survey has included the Tensas River basin in the Mississippi Embayment National Water Quality Assessment study unit and will develop a proposal for participation by five states to restore hydrology to prechannelized conditions.

The Tensas effort is serving as a model for two other watershed projects within the Lower Mississippi Delta. A Draft River Basin Study is due in late 1994. The study will have an individual watershed focus and will use Public Law 566 funds for watershed planning. This will give landowners money for watershed restoration. The community of Richland will target the Boeuf River/Richland Creek subwatershed for nonpoint source runoff reduction.

A Final Report entitled *Selecting Sites for Wetlands Restoration in the Tensas River Basin, Louisiana: A Case Study of Landscape Analysis Using the Synoptic Assessment Methodology* was submitted to EPA by the USDA Natural Resources Conservation Service. The report includes characterizations of natural and socio-

economic resources, assessment of wetland values and functional losses, development of wetland restoration criteria and rules of combination, and identification and characterization of potential wetland restoration areas in the basin. GIS mapping products were developed to assist in the assessment process.

Stakeholders:

Agricultural industry
Agricultural organizations
Conservation organizations
County and parish governments
Cultural heritage organizations
Environmental organizations
Federal, state, and local agencies
Flood control interests
Forest products industry
Grass-roots groups
Hunting and fishing interests
Local citizens
Planning agencies
Recreation industry
State and local agencies
Tourism industry
Universities
Urban interests

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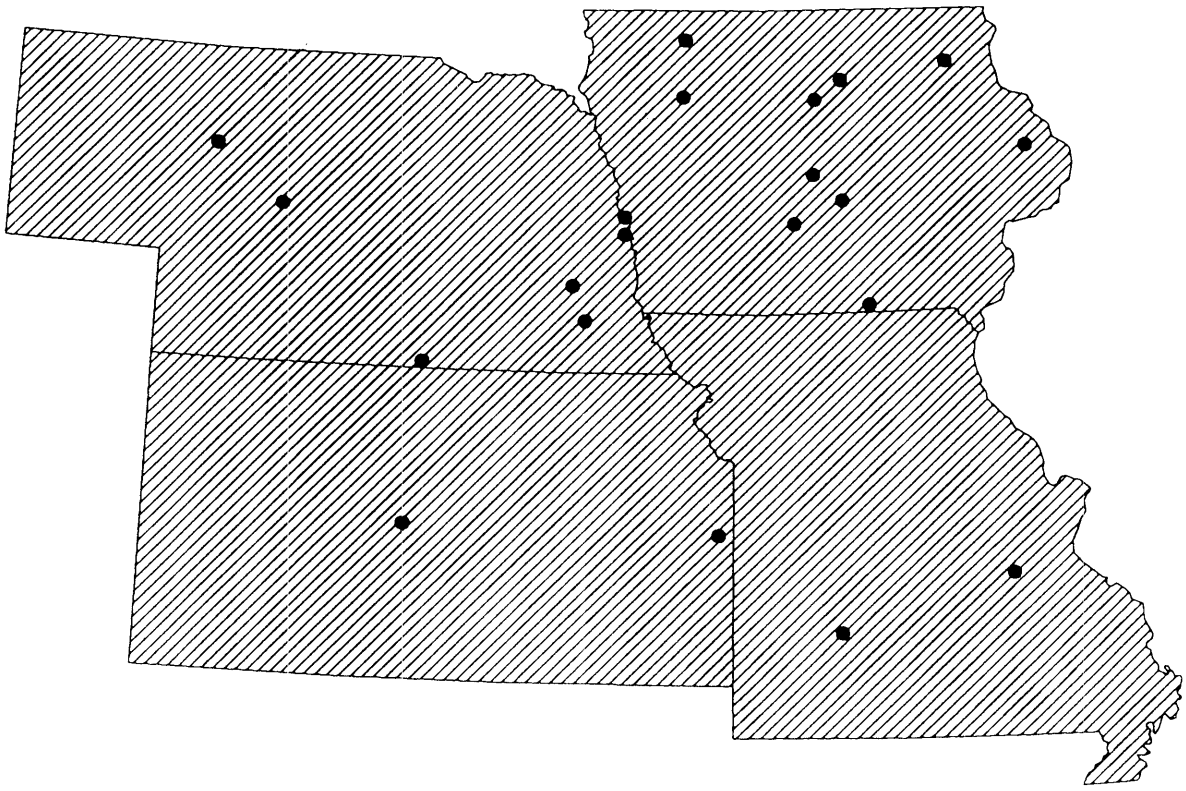
Figure 8:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 7 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale project

State Boundary

Scale 1:8,000,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-7/10
Area boundaries and reference point locations are approximate.

Region VII Projects

Example projects submitted by Region VII include the 22 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on lake or reservoir basins, and others involve ground water, large rivers and small- to moderate-size creeks, wetlands, and a prairie site. Sediments, nutrients and pesticides from croplands, rare and endangered species issues, habitat loss, eutrophication, erosion and soil loss, streambank degradation, channel modification, industrial discharges, and impairment of recreational uses are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multi-organizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the Great Plains Initiative and the Lower Mississippi Delta Initiative.

Region VII projects in the Inventory at this time include:

Beeds Lake, IA
Big Spring Basin, IA
Centerville Reservoirs Project, IA
Cheyenne Bottoms Wetland Project, KS
Clear Lake, IA
Eastern Nebraska Saline Wetlands, NE
Elm Creek, NE
Hillsdale Reservoir, KS
Iowa Great Lakes, IA
Lower Mississippi Alluvial Valley Wetland Conservation Plan, IL, LA, MS, AR, KY, TN, MO*
Meramec River, MO
Mississippi River Gateway Project, IL, MO*
Omaha Stretch of the Missouri River, IA, NE
Papio Lakes Project, NE

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Pine Creek, IA
Platte River, NE
Salt Valley Lakes Project, NE
Storm Lake Project, IA
Upper Big Mill Creek, IA
Upper Niangua River Watershed, MO
Walnut Creek Prairie Restoration Project, IA
Walnut Creek Watershed Project, IA

Beeds Lake

Size and location: Beeds Lake has an 7662-hectare (18,966-acre) watershed and is located in Franklin County in north-central Iowa.

Nature of EPA involvement: EPA has awarded 319(h) grant funds (FY93 $272,862) to support the project coordinator, public information/education program on agricultural NPS control, tech transfer activities, and selected financial incentives for best management practice (BMP) implementation and demonstration.

Organizations that initiated project:

Friends of Beeds Lake
Franklin County Soil and Water Conservation District

Major environmental problems:

- Sediment, nutrients, and pesticides from cropland
- Animal wastes

Actions taken or proposed: The Beeds Lake project was initiated with fiscal year 1993 Clean Water Act section 319 funds. The state's Resource Enhancement and Protection Program and the Agricultural Stabilization and Conservation Service Water Quality Incentive Program are also providing funding. The project workplan lays out a 3-year project, but with the involvement of an active citizens' group, watershed protection activities should extend beyond the life of the funds.

Project objectives include reducing sedimentation by 70 percent and encouraging the farmers to apply best management practices such as no-till, contour farming, and nutrient and pesticide management on the 2200 most critical hectares (5500 acres) upstream from the lake. Seventy percent of the watershed landowners are targeted for involvement over the next 2 years. Grass/tree filter strips, pasture and hayland management, critical area planting, animal waste management, stream bank stabilization, and well testing are among the other activities planned.

Stakeholders:

Boy Scouts of America
Ducks Unlimited
Franklin County Board of Supervisors
Franklin County Conservation Board
Franklin County Sanitarian
Franklin County Soil and Water Conservation District
Friends of Beeds Lake
Future Farmers of America
Hampton Fish and Wildlife Club
Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
Iowa Department of Natural Resources
Iowa State University Extension
Natural Resources Conservation Service
Pheasants Forever
The Jaycees
U.S. Environmental Protection Agency
USDA Farm Service Agency
USDA Natural Resources Conservation Service

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Big Spring Basin

Size and location: Big Spring Basin is a 267-square-kilometer (103-square-mile) ground water basin in Clayton County in northeast Iowa.

Nature of EPA involvement: EPA has awarded approximately $195,000 in grant funds to support water quality monitoring, biological assessment, and a public information/education program. EPA is represented on the advisory group to the Big Spring Project (and others related to the project, e.g., Iowa consortium on Agriculture and Water Quality).

Organization that initiated project:

Iowa Consortium on Agriculture and Water Quality

Major environmental problems:

- Elevated nitrate and coliform levels in farmstead wells
- Herbicides including atrazine in ground and surface water

Actions taken or proposed: The Big Spring project comprises a comprehensive multi-disciplinary approach including research, demonstrations, and education programs. The research phase was started in 1981, and the demonstration program started in earnest in 1986. Project activities are ongoing, with funding from numerous sources, including EPA, the USDA Natural Resources Conservation Service, various state programs, and others. Because it takes a long time for water quality monitoring to provide conclusive evidence of the effectiveness of best management practices, monitoring will continue over the next several years, even though the major portion of funding for the demonstration projects has expired.

The project focuses on the impacts of agricultural activities on ground and surface water. Specific actions include:

- Demonstration sites for animal waste management and various crop-related activities such as alfalfa management and weed management.
- Collection of detailed information through monitoring.
- Studies of the basin's aquatic ecology.
- Examination of the impacts of agriculture on aquatic ecosystems, and in turn assessment of nutrient losses that are taken up in this ecosystem.
- Surveys of farm management practices and chemical use.
- Extensive publicity and public education activities.
- Numerous field days for national and international visitors, as well as for local and regional interests.

The Big Spring project has been the basis for other innovative initiatives in Iowa such as the Integrated Farm Management Program and the Model Farms Demonstration Program. Iowa has been able to demonstrate significant reductions in nitrogen fertilizer use across the state, with no loss in crop yields. These programs were the foundation for Iowa's receiving the EPA Administrator's Pollution Prevention Award in 1992.

Stakeholders:

Clayton County Soil and Water Conservation
District Farmers
Iowa Chemical and Fertilizer Dealers Association
Iowa Consortium on Agriculture and Water Quality
Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
Iowa Department of Natural Resources
Iowa State University Extension
U.S. Environmental Protection Agency
USDA Natural Resources Conservation Service
USDA Farm Service Agency
University of Iowa

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Centerville Reservoirs Project

Size and location: The upper and lower Centerville reservoirs are man-made (in-line) lakes located in Appanoose County, in southern Iowa. These lakes have a combined surface area of 53 hectares (131 acres). The total watershed of the lakes is 1050 hectares (2599 acres). The reservoirs are the primary source of raw drinking water for the community of Centerville (population 6000). The reservoirs and the adjoining 104-hectare county park also provide wildlife habitat and are a source of recreation for local residents.

Nature of EPA involvement: EPA has awarded 319(h) grant funds (FY92 $189,165) to support the project coordinator, public information/education program on agricultural NPS control, tech transfer activities, and selected financial incentives for BMP implementations and demonstrations.

Organization that initiated project:

Appanoose County Soil and Water Conservation District

Major environmental problems:

- The nonpoint pollution affecting the reservoirs includes sediment that reduces the lake volume, causes increased treatment and repair costs at the water treatment plant, and impairs recreational use of the lakes.
- Also, nutrients from cropland runoff cause algal blooms that impair the lakes' fisheries.
- Elevated pesticide levels have also been found in the reservoirs (at times exceeding EPA drinking water standards) and are not readily removed by conventional water treatment.

Actions taken or proposed: Initiated in FY92, the project is scheduled to be implemented over 3 years.

The objectives of the project are to improve and protect the reservoirs by the implementation of best management practices (BMPs) to reduce sediment, nutrient, and pesticide levels. These BMPs include converting critical land from crop production to permanent vegetative cover, constructing sediment retention basins and wetlands above the reservoirs, conservation tillage, grassed field borders, waterways and filter strips, and nutrient and pesticide management. Concurrently, the project will address septic tanks and related urban pollution sources in the watershed.

Stakeholders:

Appanoose County Conservation Board
Appanoose County Health Office
Appanose County Soil and Water Conservation District
Centerville Chamber of Commerce
Centerville Municipal Water Works
Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
Iowa Department of Natural Resources
Iowa State University Extension Service
U.S. Environmental Protection Agency
USDA Farm Service Agency

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Cheyenne Bottoms Wetland Project

Size and location: The project is located in Barton County, Kansas, and covers approximately 24,240 hectares (60,000 acres).

Nature of EPA involvement: Cooperative Agreement CR-823025, Kansas State University, Principal Investigator James Koelliker, Project Period: 10/01/94-09/30/97, Total Budget: $225,-962; EPA Contribution: $65,823. Project Officer, Stephen Kraemer, USEPA/RSKERL-Ada.

The Project Officer has an In-house Research Project supporting this effort, including an on-site contractor work assignment. Liason: Cathy Tortorici, USEPA Region VII.

Organization that initiated project: U.S. Department of Agriculture Region VII contacted U.S. EPA Office of Research and Development/ Robert S. Kerr Environmental Research Laboratory (RSKERL)-Ada through the RARE program.

Major environmental problems:

- Cheyenne Bottoms is a wetland of international importance, being a critical stopover point for more than half of the population of northward-migrating shorebirds of North America and a habitat for numerous species of mammals, reptiles, amphibians, fish, invertebrates, and plants.
- Six species on the federal endangered and threatened species list regularly use the Bottoms: whooping crane, piping plover, snowy plover, least tern, peregrine falcon, and bald eagle.
- The Cheyenne Bottoms is the one of the last of the major wetland systems left in the State of Kansas, and the maintenance of standing water is critical for habitat function. The natural water supply needs to be supplemented with diversions from neighboring watersheds (Wet Walnut Creek, Dry Walnut Creek, Pawnee) and from the Arkansas River. These sources of water are under increasing pressure from agricultural and municipal demands, and a deficit situation exists.
- Also, existing and proposed flood control structures within the Wet Walnut Creek and Pawnee watersheds are potentially altering the available water supply to the Bottoms.

Actions taken or proposed: A detailed hydrological budget model has been proposed. The modeling study will be comprehensive, including both ground water and surface water, and continuous in time, simulating transient watershed responses. The impact of irrigation wells and flood control structures within the watersheds will be investigated through scenario testing. A research report will be prepared by September 1997.

Stakeholders:

Citizens within the watersheds
State of Kansas (Kansas Wildlife and Parks, Kansas Water Office, Division of Water Resources, Board of Agriculture)
The Nature Conservancy
U.S. Army Crops of Engineers
U.S. EPA
USDA Natural Resources Conservation Service

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Clear Lake

Size and location: The Clear Lake watershed covers an 3500-hectare (8700-acre) area located in Cerro Gordo County in north-central Iowa.

Nature of EPA involvement: EPA has awarded 319(h) grant funds (FY94 $227,896) to support the project coordinator, public information/education program on urban and agricultural NPS control, tech transfer activities, and selected financial incentives for best management practice (BMP) implementation and demonstration.

Organization that initiated project:

Cerro Gordo Soil and Water Conservation District

Major environmental problems:

- Nutrients, specifically nitrogen and phosphorus
- High turbidity
- Low water clarity
- Algal blooms
- Impaired fishery
- Inhibited recreational use
- Runoff from urban areas and cropland

Actions taken or proposed: This 3-year project was initiated with Fiscal Year 1994 Clean Water Act Section 319 Nonpoint Source Management funds. The project will address both urban and agricultural nonpoint source water pollution through household and agricultural campaigns that consist of demonstrations and education efforts, technical assistance, and financial incentives for best management practice implementation. The urban campaign includes reducing nutrient impacts at the business and residential level as well as a volunteer water quality monitoring program. The agricultural campaign includes wetlands development, nutrient and pest management, and both structural and nonstructural practices in the watershed. Specific goals are to reduce urban phosphorus and nitrogen inputs by 70 percent and 50 percent, respectively; to reduce or eliminate algal blooms; and to improve water clarity by reducing phytoplankton levels.

Stakeholders:

Cerro Gordo County Health Department
Cerro Gordo County Soil and Water Conservation District
Cerro Gordo County Solid Waste Agency
Clear Lake Economic Development Corporation
Clear Lake Sanitary District
Ducks Unlimited
Hancock County Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Northern Iowa Area Community College
Pheasants Forever
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Eastern Nebraska Saline Wetlands

Size and location: This project covers 2280 hectares (5644 acres) of wetlands and deepwater habitats in Lancaster and southern Saunders Counties, Nebraska.

Nature of EPA involvement: Awarded two grants (1989 and 1990) to state for resource inventory and public outreach projects; participating on interagency assessment team with Corps of Engineers (ACE), U.S. Fish and Wildlife Service (FWS), Nebraska Game and Parks Commission (NGPC), and Nebraska Department of Environmental Quality (NDEQ) to conduct an advanced planning project.

Organizations that initiated project:

Original work initiated by EPA and NGPC

Major environmental problems: The saline wetlands are considered one of the most restricted and imperiled natural community types in the state. They harbor holophytic plants considered rare in state. These wetlands provide (1) habitat for more than half of the total number of bird species in state, including migratory shorebirds and (2) the sole habitat for an endemic tiger beetle (*Cicindela nevadica* var. *lincolniana*).

These wetlands continue to be threatened by commercial and residential development pressures from the city of Lincoln, road construction, and the potential for agricultural development.

Actions taken or proposed: The first grant resulted in a report entitled *An Inventory and General Assessment of Eastern Nebraska Saline Wetlands in Lancaster and Southern Saunders Countries.* The second grant resulted in the development of outreach materials, including a narrated slide presentation, color brochure, and color poster. Recent interagency efforts have resulted in the development of a report entitled *Resource Categorization of Nebraska's Eastern Saline Wetlands* and associated geographic information system (GIS)-based inventory maps, which have been incorporated and approved as part of the Lincoln-Lancaster County 5-Year Comprehensive Development Plan. Finalization of a report entitled *Mitigation Guidelines for Nebraska's Eastern Saline Wetlands* is pending. The latter will include guidance for developing saline wetlands mitigation banks.

Stakeholders:

Lower Platte South Natural Resources District, Lincoln-Lancaster County Planning Department, USDA Natural Resources Conservation Service, Nebraska Natural Resources Commission, Lincoln Board of Realtors, Inc., ACE, NGPC, NDEQ, and FWS

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Elm Creek

Size and location: The Elm Creek watershed covers a 14,460-hectare (35,800-acre) area located in Webster County in south-central Nebraska.

Nature of EPA involvement: EPA has awarded section 319(h) grant funds to accomplish key parts (monitoring, information/education, and targeting of innovative best management practices (BMPs) in critical areas) of this larger holistic watershed project. Elm Creek is a National Nonpoint Source Watershed Projects Monitoring Program site.

Organization that initiated project:

Lower Republican Natural Resource District

Major environmental problems:

- Nonpoint source pollution in the form of instream sedimentation affecting cold-water fishery
- Erosion from near-stream gullies/ overfalls, upland areas of cropland and pasture, irrigation return flows, and livestock access
- Streambank erosion

Actions taken or proposed: Elm Creek is a U.S. Department of Agriculture (USDA) Hydrologic Unit Area project and is one of EPA's National Monitoring Program Projects under section 319 of the Clean Water Act (CWA). A small amount of USDA Water Quality Incentive Program funding has also been devoted to the project area.

The objectives of the project are to:

- Identify and target critical areas of nonpoint source pollutant loading contributing to impairment of beneficial uses.
- Implement demonstrable land treatment practices that are "cost-effective" and can functionally reduce sediment loading to Elm Creek by 50 percent.
- Facilitate a nonpoint source public education effort within the project area.
- Conduct water quality monitoring; and integrate CWA section 319 funding/ activities with other funding/activities in the watershed to provide a holistic watershed management project for water quality protection.
- Practices being employed include nutrient and pest management, grazing management, cattle exclusion from the streams, and stream bank restoration.

Stakeholders:

Lower Republican Natural Resources District
Nebraska Department of Environmental Quality
Nebraska Game and Parks Commission
U.S. Environmental Protection Agency
University of Nebraska Extension
USDA Natural Resource Conservation Service

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Hillsdale Reservoir

Size and location: Hillsdale Reservoir is a 1850-hectare (4580-acre) Corps of Engineers impoundment located in Kansas 48 kilometers (30 miles) southwest of Kansas City, Kansas. Its watershed covers 37,240 hectares (92,180 acres).

Nature of EPA involvement: EPA has provided Total Maximum Daily Load (TMDL) mini-grant and 319(h) funding for the Hillsdale Watershed Protection project, as well as water quality monitoring and laboratory support. An EPA staff position participates (with the local project manager and information/education coordinator) as a member of the project implementation team by providing technical and programmatic support. EPA has served as a catalyst to bring other state, federal, and local agencies into the project.

Organizations that initiated project:

Citizens Management Committee
Lakes District Research Conservation and Development District

Major environmental problems:

- Nutrient overload and associated eutrophication effects from both point and nonpoint sources
- Minor threat from atrazine

Actions taken or proposed: A nutrient total maximum daily load has been developed. A local association of concerned citizens and agencies, together with the Kansas Department of Health and Environment and EPA staff support, is implementing a watershed management program using Clean Water Act section 319, U.S. Department of Agriculture Water Quality Incentives Program, and state funding to control animal waste and cropland nutrient sources and to protect the recreational and drinking water supply benefits of the reservoir.

Stakeholders:

Association of citizens and agencies
Citizens Management Committee
Johnson County Environmental Department
Kansas Department of Health and Environment
Lakes District Resources Conservation and Development District
Rural Water Districts
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Geological Survey

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Iowa Great Lakes

Size and location: The Iowa Great Lakes consist of a 25,600-hectare (64,000-acre) watershed in Dickinson County in northern Iowa.

Nature of EPA involvement: EPA has provided project funding through 104(b)3 (FY89 $9,000) and 319(h) grant funds (FY90 $50,000; FY92 $100,860; FY94 $44,860; FY95 $128,430) to support the project coordinator, public information/education program on urban and agricultural NPS control, wetlands protection and restoration, and selected financial incentives for BMP implementations and demonstration.

Organization that initiated project:

Dickinson County Soil and Water Conservation District

Major environmental problems:

- Sediment
- Nutrient runoff from both rural and urban lands threatening 14 natural lakes

Actions taken or proposed: This 5-year project was initiated with fiscal year 1990 Clean Water Act section 319 funds and has also received funding from the U.S. Department of Agriculture (USDA) Farm Service Agency through the Agricultural Conservation Program, the Iowa Resource Enhancement and Protection Program, and the U.S. Fish and Wildlife Service. The purpose of the project is to reduce the amount of sediment, nutrients, pesticides, and animal wastes entering the numerous lakes in the watershed. Efforts are being focused on avoiding unnecessary or excessive nutrient applications, especially phosphorus; assisting with practices that reduce water running off cropland; showing lakeshore landowners how they can better manage their property to protect water quality; and using wetland restoration and critical slope protection programs.

In the 2 years since the project was initiated, about 32 hectares (80 acres) of wetlands in critical drainage areas have been improved, restored, or protected. These wetlands act as filters to stop pollution before it enters the lakes. New areas of trees and grasslands have been established on 31 hectares (78 acres) in the watershed; project workers have made site visits with a total of 83 of the 185 watershed landowners to discuss water quality; and landowners throughout the watershed, including urban residents, have gained an awareness of water quality through the project's education program.

One-third of the watershed is in Minnesota, and a cooperative effort occurs across state boundaries. Plans are also under way to apply for similar project funding for the Minnesota side of the watershed.

Stakeholders:

Dickinson County Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
Iowa Department of Natural Resources
Iowa Natural Heritage Foundation
Iowa State University Extension
Local lake protective associations
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
USDA Farm Service Agency
USDA Natural Resources Conservation Service

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Lower Mississippi Alluvial Valley Wetland Conservation Plan

Size and location: 1120-kilometer (700 miles) stretch from Cairo, Illinois south to the Gulf of Mexico; historical alluvial plain of the Mississippi River.

Nature of EPA involvement: Currently, providing funding assistance to multiple state agencies within the Lower Mississippi Valley, as well as federal interagency projects addressing forestry and resource planning issues. EPA and several regional sponsors will be coordinating the development of a regional wetlands conservation plan.

Organizations that initiated project: Multiple federal agencies, including EPA, U.S. Geological Survey (USGS), National Biological Survey (NBS), Natural Resources Conservation Service (NRCS), and U.S. Fish and Wildlife Service (FWS) are initiating ecosystem-scale planning and research efforts in the region.

Major environmental problems: Nonpoint source pollution in surface waters, extensive forested wetlands loss, impacted fisheries and wildlife habitats, extensive hydrological modifications.

Actions taken or proposed: This multistate, multiregion initiative focuses on wetland restoration/reforestation and reduction of nonpoint source water pollution throughout the Lower Mississippi River Alluvial Plain. A regional sponsor will coordinate state and federal efforts by developing and implementing a regional wetlands conservation plan. Establishing networks among interest groups and data sharing through the use of a geographic information system will be emphasized, as well as prioritization of wetland restoration/acquisition sites.

Stakeholders:

Natural resource state agencies from MS, LA, TN, AR, KY, MO, and IL, agricultural community, forestry community, landowners, hunting and outdoor recreation groups, environmental organizations, sustainable economy organizations, federal natural resource and public health agencies, including EPA, National Biological Survey, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, U.S. Geological Service, U.S. Forest Service, and Agency for Toxic substances and Disease Registry.

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Meramec River

Size and location: The Meramec River meanders some 350 kilometers (220 miles) through six Missouri Ozark Highland counties—Dent, Phelps, Crawford, Franklin, Jefferson, and St. Louis—before it empties into the Mississippi River. Between the mouth and its source, it falls 313 meters (1,025 feet). The Meramec watershed covers portions of eight additional counties—Maries, Gasconade, Iron, Washington, Reynolds, St. Francois, Ste. Genevieve, and Texas—totaling approximately 10,300 square kilometers (3,980 square miles).

Nature of EPA involvement: EPA, through a cooperative agreement with the Missouri Department of Conservation, is providing technical assistance as well as a State Wetland Protection Development Grant. EPA will also be assisting in future planning efforts in the watershed.

Organization the initiated project:

Missouri Department of Conservation

Major environmental problems:

- Sand and gravel dredging operation impacts
- Developmental pressures
- Increased agricultural and livestock production
- Nonpoint source pollution
- Point source pollution
- Threats to water quality and drinking water supply
- Flooding
- Impaired aquatic diversity (including federally and state threatened and endangered species) due to habitat loss and water quality degradation
- Riparian corridor destruction
- Wetland loss

Actions taken or proposed: The Missouri Department of Conservation under a State Wetland Protection Development Grant from EPA will coordinate scientific information with stakeholders to develop a watershed plan for the Meramec basin through the following measures:

- Provide scientific information on physiography, geology, hydrology, geomorphology, land usage, Clean Water Act section 404 jurisdiction (stream and wetland), structural influences, water quality, fish contamination, habitat conditions, community sampling of fish and invertebrates, and locations of threatened and endangered species.
- Provide data in geographic information system form.
- Identify basin problems and potential solutions.
- Prepare a basin-specific, dynamic plan to aid managers in addressing management, coordination, and information needs to integrate wetland protection and management into a watershed context.
- Identify potential sociopolitical partnerships needed to implement improvement programs.

Stakeholders:

Citizen groups
Landowners
Local governments
Missouri Department of Conservation
Missouri Department of Natural Resources
Missouri Stream Teams
Private organizations
Regional planning groups
U.S. Army Corps of Engineers, St. Louis District
U.S. Environmental Protection Agency
USDA Natural Resources Conservation Service

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Mississippi River Gateway Project

Size and location: The project area encompasses three counties in Illinois (Madison and St. Clair) and Missouri (St. Louis). The project focuses mainly on the western portions of Madison and St. Clair Counties of Illinois at the present time.

Nature of EPA involvement: EPA has been involved with the local community as well as with federal, state, and local agencies to address the human health and environmental problems associated with hazardous and solid wastes, flooding, chemical disposal, and lead contamination in the community. These problems are being addressed through pollution prevention efforts, cleanup of trash and waste associated with the lack of garbage pick-up, and compliance assistance/enforcement programs. Concerns related to environmental justice are being addressed by working with the local community leaders. EPA is also initiating efforts with local environmental groups to begin restoring lost or degraded habitats and providing environmental education.

Organization that initiated project: This effort was begun by EPA Region V but is supported by EPA Region VII, the U.S. Department of Housing and Urban Development, the Illinois Environmental Protection Agency, the Missouri Department of Health, and the Illinois Department of Public Health.

Major environmental problems: The major environmental problems are listed above. Some of these are related to the economic situation of the community. East St. Louis, Illinois, had lost much of its tax base and was unable to provide some of the basic services to its residents, e.g., garbage pickup, adequate wastewater treatment, safe housing, etc. By working with the other agencies, EPA has begun to address the community's needs.

Actions taken or proposed: Pollution prevention activities have begun to be implemented in the Greater St. Louis area to achieve reductions in pollutants of greatest risk. For instance, an effort has been undertaken to reduce human exposure to environmental and household lead. EPA is in the process of determining whether minority or low-income populations in the initiative area are disproportionatly exposed to hazardous waste, hazardous substances or other hazardous activities. EPA is working to develop a community-based public involvement program that encourages dialogue among governments, industry, community groups, and others. EPA is also developing a program to address the issue of lost and degraded habitats and the use of high quality habitats in environmental education.

Stakeholders: Illinois Environmental Protection Agency, Illinois Department of Public Health, Missouri Department of Health, U.S. Department of Housing and Urban Development, EPA Regions V and VII, local community groups and local industry. EPA expects that as the initiative grows, additional agencies will assist in this project.

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Omaha Stretch of the Missouri River

Size and location: The Omaha Stretch of the Missouri River corridor extends approximately 69 kilometers (43 miles) from north to south, from the Washington-Burt County, Nebraska, line to the mouth of the Platte River.

Nature of the EPA involvement: EPA is a new member of the growing partnership. Media programs are focusing on water, waste, air, and pesticide issues. The Great Plains Program has designated the Omaha Stretch as one of its laboratories for place-based management. EPA is also participating in studies at two wetland sites and sponsoring environmental education programs.

Organization that initiated project:

The Papio-Missouri River Natural Resources District of Nebraska

Major environmental problems: The Missouri River ecosystem has historically suffered major changes and dramatic losses. In the Omaha Stretch, forests and wildlife have been harvested and settlements have covered the valley. The once braided and meandering river has been channelized and confined to a single, deep navigation canal. With levees and dams, its hydrologic cycle, including natural flooding, has nearly been eliminated. Wetlands and diverse kinds of fishery habitat have been lost, and lands continue to be converted from forests and wetlands to cropland and residential areas. The City of Omaha is a major industrial center with many discharges to water, air, and land, all of which have led to human health concerns and ecological stress. Agriculture in the region contributes nonpoint source runoff high in nutrients and pesticides.

Actions taken or proposed: Through the cooperative efforts of federal, state, and private organizations, projects are currently under way to restore various ecological components as well as encourage sustainable development. The City of Omaha has developed revitalization plans to improve access to the river, to build a trail system for bicycling and walking through Omaha, and to improve the waterfront and municipal parks. Also under way are an environmental education program to increase student and community awareness of the Missouri River ecosystem and a "Back to the River" outreach campaign to encourage citizens to explore the river for its beauty, history, and ecological importance.

Stakeholders:

Fontanelle Forest Assoc.
Iowa Department of Natural Resources
Iowa County Conservation Boards
National Audubon Society
National Park Service
Nebraska Game and Parks Commission
Nebraska Department of Economic Development
Nebraska Natural Resources Commission
Missouri River Preservation Authority
Omaha and Winnebago Tribes of Nebraska
U.S. Army Corp of Engineers
U.S. EPA
U.S. Fish and Wildlife Service

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Papio Lakes Project

Size and location: The Papio Lakes Project encompasses five lake watersheds located in and around Omaha, Nebraska. The five lakes are Glen Cunningham (158 hectares/390 acres), Standing Bear (55 hectares/135 acres), Wehrspann (99 hectares/245 acres), Zorinsky (102 hectares/253 acres), and Summit (77 hectares/190 acres). The total drainage area for the five lakes encompasses 16,282 hectares (40,301 acres).

Nature of EPA involvement: EPA has been involved in this project since 1989 when all five lakes were funded under the federal Clean Lakes Program. Continued involvement has come through the federal Nonpoint Source Management Program.

Organizations that initiated project:

Papio-Missouri River Natural Resources District
City of Omaha

Major environmental problem: Excessive sedimentation and nutrient loading stemming from agricultural and construction activities. Associated problems such as poor water clarity and habitat loss are impacting aesthetics and aquatic life.

Actions taken or proposed: The project sponsor is utilizing a combination of federal, state, and local funding and expertise to address the problems. Section 314 and 319 funding, in addition to local funding, has been approved for the design and construction of wetlands. U.S. Department of Agriculture (USDA) funding through the Water Quality Incentives Program has been approved for treatment practices on agricultural lands. The University of Nebraska-Lincoln Cooperative Extension Service, Papio-Missouri River NRD, Nebraska Department of Environmental Quality, and EPA have entered into a joint venture to provide an extension educator for the project. Local Planning Agencies are developing strategies to reduce construction site impacts.

The objectives of the project are to:

(1) Reduce lake sedimentation rates to less than 0.3 percent of the initial lake volume per year.
(2) Improve and maintain summer water clarity measurements to depths greater than 0.75 meter.
(3) Maintain summer chlorophyll a concentrations at levels less than 33 mg/1.

Stakeholders:

City of Gretna
City of Omaha
Nebraska Department of Environmental Quality
Nebraska Game and Parks Commission
Papio-Missouri River Natural Resources District
University of Nebraska Cooperative Extension Service
U.S. Army Corp of Engineers
U.S. Environmental Protection Agency
USDA Natural Resources Conservation Service

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Pine Creek

Size and location: The Pine Creek watershed covers 3910 hectares (9,680 acres) in Hardin and Grundy Counties in north-central Iowa. Upper and Lower Pine Lakes are the feature waterbodies of Pine Lakes State Park.

Nature of EPA involvement: EPA has awarded 314 Phase I and II Clean Lakes Program and 319(h) grant funds. The 319 funds (FY92 $207,891) support the project coordinator, public information/education program on agricultural NPS control, tech transfer activities, and selected financial incentives for best management practice (BMP) implementation and demonstration.

Organizations that initiated project:

Hardin and Grundy County Soil and Water Conservation Districts

Major environmental problems:

- Sediment and nutrients from eroding croplands
- Frequent algal blooms
- Impaired fisheries
- Degraded aquatic habitat
- Reduced recreational use
- Animal waste
- Stream bank erosion

Actions taken or proposed: Iowa received a Clean Lakes Program grant in 1989 to conduct a Phase I diagnostic/feasibility study for Upper and Lower Pine Lakes and the surrounding watershed. This study provided the basis for this 3-year water quality protection project. Watershed measures are being carried out using funds from Clean Water Act section 319 Nonpoint Source Program, USDA Farm Services Agency and the State's Resource Enhancement and Protection Programs. Restoration of the lakes is being carried out using Clean Lakes Program Phase II funding awarded in 1992. The objectives of the project include:

- Implementing BMPs, on a priority basis, to reduce sediment and nutrient loads to Upper and Lower Pine Lakes by 60 percent.
- Implementing BMPs on 1,200 hectares (3,000 acres) in the watershed per year.
- Increasing the area of warm season grasses in the watershed by 100 percent.
- Holding farmer-to-farmer meetings to facilitate technology transfer to landowners and operators in the watershed.
- Demonstrating and promoting the economic feasibility of BMPs to the local community and public at large.

Currently, about 30 producers are participating in the project, which is designed to encourage local producers to implement comprehensive resource management systems to control erosion, reduce pesticide and fertilizer use, and better protect stream banks. Activities include wildlife habitat management, pasture management, animal waste management, livestock exclusion, stream bank stabilization, filter strips, critical area plantings, integrated crop management, and others.

Stakeholders:

Grundy County Soil and Water Conservation District
Hardin Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
Iowa Department of Natural Resources
Iowa State University Extension
U.S. Environmental Protection Agency
USDA Natural Resources Conservation Service

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Platte River

Size and location: Originating in the mountains of Colorado and Wyoming, the Platte River watershed drains two-thirds of the state of Nebraska. Ground water is an important part of this ecosystem.

Nature of EPA involvement: EPA has served as a catalyst and facilitator for the Platte Watershed Program. EPA has devoted staff to program coordination, assessments, and outreach for this area, Region VII's major large-scale watershed approach project and a priority "place" under the Great Plains Program. Funding from various sources has been focused on investigation and implementation activities in the Platte watershed. The Middle Platte wetlands watershed is also a national case study site for conducting watershed-scale, multiple-stressor ecological risk assessments and a national pilot area for wetlands biocriteria development.

Organizations that initiated project:

U.S. Environmental Protection Agency, Region VII

Nebraska Department of Environmental Quality (NDEQ)

Major environmental problems:

- Nonpoint sources of pollution
- Nitrate and pesticide contamination
- Habitat destruction and alteration
- Hydrologic modification
- Flood plain development

Actions taken or proposed: The Platte Watershed Program is a partnership to protect and enhance the ecosystem of the Platte River and its alluvial aquifer in Nebraska. This ecosystem serves as a vital link in the Central Flyway migratory bird route; sustains a rich diversity of plant and animal life, including threatened and endangered species; and support an economy based on rich agricultural production. The Platte River alluvial aquifer provides drinking water to two-thirds of Nebraska's citizens. The Platte River also supports multiple uses including recreation, aquatic life and wildlife, irrigation, industrial water supply, and hydropower generation.

EPA has been working with the Nebraska Department of Environmental Quality (NDEQ), the University of Nebraska, and other partners to develop a comprehensive ecosystem approach to the Platte River Basin that prevents pollution and maintains a healthy, sustainable ecosystem which provides for the health and welfare of humans as well as other living things.

The strategy is to build state and local capacity to protect the ecosystem by organizing partnerships and involving stakeholders in cooperative assessment and action. The Platte Watershed Program is using a two-pronged approach to meet its goal: (1) coordinating and focusing activities basinwide and (2) involving stakeholders in assessing problems and developing action plans by subbasin.

EPA is working in coordination with NDEQ's newly adopted Basin Management Approach to compile and assess existing water quality and pollutant source data for each of the six Platte River sub-basins in Nebraska. This information will support NDEQ's development of water quality monitoring project plans and basin management plans for each sub-basin. Involvement of parties most affected by management decisions (federal, state, and local stakeholders, as appropriate) in monitoring, identifying problems, setting environmental goals, and measuring success will be crucial to development of these basin management plans.

For the Middle Platte sub-basin, the assessment will also includes ecological data. The Middle Platte sub-basin was selected by EPA in 1993 as one of five national case study sites to develop the procedures for conducting multiple-stressor, watershed-level ecological risk assessments. The purpose of the case studies is to develop a scientific process that increases understanding of how ecological resources within watersheds respond to a combination of human activities. By comparing the five case studies, EPA hopes to identify the principles of watershed risk assessment and develop guidance on how to perform such assessments. The Middle Platte case study is intended to demonstrate how a watershed approach incorporating ecological response assessment might be used by stakeholders in planning for a sustainable future. The

Middle Platte case study is being conducted by a workgroup consisting of technical representatives from U.S. EPA, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, The Nature Conservancy, the University of Nebraska, and participants from 10 state and local natural resource agencies and organizations in Nebraska.

Building on the Middle Platte ecological response assessment case study, the Platte Watershed Program is serving as a pilot area for developing wetlands biocriteria, using environmental indicators to measure progress, and understanding landscape structure in relation to ecosystem function. An economic analysis is also being planned as a companion project to the ecological response assessment. Together, the ecological and economic analyses will provide information for resource managers to use in evaluating management options and identifying those which maximize ecological protection while maintaining a viable economy.

Outreach and education are important components of the Platte Watershed Program as well. Through the Summer Orientation About Rivers (SOAR) Program of the Prairie Plains Resources Institute, students experience firsthand the relationship between the quality of the natural resource base and the quality of their lives. Scientists and natural resource managers share information and discuss issues related to the Platte watershed during the annual Platte Basin Ecosystem Symposium. Cooperative Extension Specialists at the University of Nebraska-Lincoln help form partnerships, facilitate stakeholder involvement, and conduct outreach and educational activities.

Stakeholders:

Agricultural, Environmental, Business, and Community Groups
Municipalities
Nebraska Natural Resource Districts
Nebraska Department of Agriculture
Nebraska Department of Environmental Quality
Nebraska Game and Parks Commission
Nebraska Natural Resources Commission
Nebraska Water Resources Commission
Platte River Whooping Crane Habitat Maintenance Trust
Prairie Plains Resource Institute
Bureau of Reclamation
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Utilities (power and irrigation)

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Salt Valley Lakes Project

Size and location: The Salt Valley Lakes Project encompasses five lake watersheds located in and around Lincoln, Nebraska. The five lakes are Wildwood (42 hectares/103 acres), Branched Oak (727 hectares/1800 acres), Pawnee (299 hectares/740 acres), Holmes (40 hectares/100 acres), and Meadowlark (22 hectares/55 acres). The total drainage area for the five lakes encompasses 37,092 hectares (91,811 acres).

Nature of the EPA involvement: EPA has been involved in this project since 1989 when all five lakes were funded under the federal Clean Lakes Program. Continued involvement has come through the federal Nonpoint Source Management Program.

Organization that initiated project:

Lower Platte South Natural Resources District (LPSNRD)

Major environmental problems: Excessive sedimentation and nutrient loading stemming from agricultural and construction activities. Associated problems such as poor water clarity and habitat loss are impacting aesthetics and aquatic life.

Actions taken or proposed: The LPSNRD is utilizing a combination of federal, state, and local funding and expertise to address the identified problems. Two lakes (Wildwood and Holmes) have been approved by EPA for funding under the Nonpoint Source Management Program. Funding will be used for information/education, treatment on agricultural lands, and for the renovation and construction of sediment/nutrient traps and wetlands. Local funding combined with section 205(j)(5) funding from EPA was used to renovate Meadowlark Lake, which included dredging and the development of a wetland area. Section 104(b),(c) funding will be combined with local and state funding to conduct a total maximum daily load study on Holmes Lake. The LPSNRD has established a cost-share program for urban best management practices. The LPSNRD, University of Nebraska Cooperative Extension Service, EPA, and Nebraska Department of Environmental Quality have entered into a joint venture to provide an extension educator for the project.

The objectives of the project are to:

(1) Reduce and maintain lake sedimentation rates to less than 0.3 percent of the initial lake volume per year.

(2) Improve and maintain summer water clarity measurements to depths greater than 0.75 meters.

(3) Maintain summer chlorophyll a concentrations at levels less than 33mg/l.

Stakeholders:

Lower Platte South Natural Resources District
Nebraska Department of Environmental Quality
Nebraska Nurseries
U.S. Environmental Protection Agency
University of Nebraska Cooperative Extension Service

Contact:

Paul Zillig
Lower Platte South Natural Resources District
3125 Portia Street
P.O. Box 83581
Lincoln, NE 68501-3581

Storm Lake Project

Size and location: Storm Lake is located in Buena Vista County in Northwestern Iowa. The lake is a 1244-hectare (3080-acre) natural glacial lake. The watershed is 7098 hectare (17,570-acre) and is drained by Powell Creek which feeds into a 73-hectare (180-acre) wetland known as Little Storm Lake before entering Storm Lake proper. The communities of Storm Lake (pop. 9000) and Alta (population 1720) are located within the watershed.

Nature of EPA involvement: EPA has awarded 319(h) grant funds (FY93) $204,445) to support the project coordinator, public information/ education program on agricultural NPS control, tech transfer activities, and selected financial incentives for BMP implementations and demonstrations.

Organization that initiated project:

Buena Vista Boil and Water Conservation District

Major environment problems: The environmental problems affecting Storm Lake include sediment that reduces lake volume, nutrients and pesticides from both agricultural and urban landuse practices, waste runoff from animal feeding operations, and illegal wastewater hookups to the Storm Lake storm water system. These sources of nutrients cause repeated algal blooms that impair lake fisheries and other recreational uses.

Actions taken or proposed: Initiated in FY93, the project is scheduled to be implemented over three years. The objectives of the project are to reduce sedimentation, and nutrient and pesticide pollution of Storm lake from both agricultural and urban sources. This will be accomplished through total farm ecosystem based planning and application of structural and management best management practices that include conservation tillage, contour farming, terraces, grassed waterways, filter strips, pasture and hayland management, critical area planting, wildlife and upland habitat, animal waste management systems and a "priority area" application of nutrient and pesticide management to acres identified as having the greatest impact on lake water quality. The project is coordinating activities with the ongoing Storm Lake Demonstration Project sponsored by the Leopold Center for Sustainable Agriculture that was initiated in 1990 and the Iowa Department of Natural Resources Phase One Clean Lakes study. These projects are monitoring water quality changes in Storm Lake. The project will also work in concert with a riparian tree buffer strip demonstration project being conducted by Iowa State University and supported with FY93 section 319 funds. The riparian area is located along a 1-mile reach of Powell Creek in the Storm Lake watershed.

Stakeholders:

Buena Vista County Board of Health
City of Storm Lake
Iowa Department of Natural Resources
Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
Leopold Center for Sustainable Agriculture
Storm Lake Preservation Association
U.S. Environmental Protection Agency
USDA Natural Resources Conservation Service
USDA Farm Service Agency

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Upper Big Mill Creek

Size and location: The Upper Big Mill Creek watershed encompasses 3219 hectares (7967 acres) and is located in Jackson County in East-Central Iowa. Big Mill Creek is one of the state's highest quality cold-water streams and one of only six streams in Iowa that support a naturally reproducing population of brown trout.

Nature of EPA involvement: EPA has awarded 319(h) grant funds (FY93 $113,394) to support the project coordinator, public information/ education program on agricultural nonpoint source (NPS) control, tech transfer activities, and selected financial incentives for best management practice (BMP) implementation and demonstration.

Organization that initiated project:

Jackson County Soil and Water Conservation District

Major environmental problems: The largest environmental problem affecting the water quality of Big Mill Creek is sediment from stream bank erosion and from the erosion of 1280 hectares (3,200 acres) of cropland in the watershed that have also been identified as Highly Erodible Land (HEL). Sediment covers the natural, rocky substrate and reduces the habitat of fish and macroinvertebrates. Nutrients and pesticides from cropland and livestock waste are considered secondary water quality concerns. In addition, sinkholes and springs in the watershed need to be protected.

Actions taken or proposed: Initiated in FY93, the project is scheduled to be implemented over 3 years. The purpose of the project is to implement BMPs in the Big Mill watershed that improve water quality by reducing soil erosion on crop and pasture land, improving nutrient and pesticide management, and reducing bank erosion, and improve stream conditions, reduce bank erosion, and improve in-stream and riparian habitat. The BMPs that will be demonstrated are sediment control basins, crop rotation, contouring, conservation tillage, sinkhole management, improved livestock waste practices, stream corridor protection, alternative watering systems, and improved nutrient and pesticide management. The objectives of the project are to reduce sedimentation by 60 percent, reduce livestock waste reaching the stream by 50 percent, reduce fertilizer and pesticide application by 20 percent from current levels, and develop a public information and education program to inform local producers about crop/livestock BMPs and stream corridor habitat protection practices.

Stakeholders:

Iowa Department of Natural Resources
Iowa Department of Agriculture and Land Stewardship/ Division of Soil Conservation
Iowa State University Extension
Izaak Walton League (Maquokets Chapter)
Jackson County Conservation Board
Jackson County Soil and Water Conservation District
The University of Dubuque
USDA Farm Service Agency
USDA Natural Resources Conservation Service

Contact:

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Upper Niangua River Watershed

Size and location: The Upper Niangua River basin has an area of 95,000 hectares (236,000 acres) and is located in south-central Missouri.

Nature of EPA involvement: EPA has awarded 205(j)(5) and 319(h) grant funds ($365,654). The project is a candidate for the National Nonpoint Source (NPS) Watershed Projects Monitoring Program. EPA and the Missouri Department of Natural Resources (DNR) have partnered with the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) to provide funding for long-term monitoring in connection with a Hydrologic Unit Area project targeted at the excess nutrient load in the Niangua River.

Organizations that initiated project:

Missouri Department of Natural Resources
USDA Natural Resources Conservation Service (NRCS)

Major environmental problems:

- Excessive nutrients
- Excessive bacteria in surface and groundwater
- Threatened fish species - Niangua darter
- Declining species and critical habitat
- Threaten water supply and recreation resources

Actions taken or proposed: The project is being implemented under the lead of the local Soil and Water Conservation District and involves a number of partners carrying out different components. Activities include biological, habitat, and water quality monitoring; animal manure management systems; farmstead assessment; and plugging abandoned wells. An activity with local 4-H organizations was undertaken to involve youth in water quality issues. USDA Water Quality Incentive Program funds are also being applied to address water quality concerns in the watershed. Projects were initiated in 1991 and will continue through 1997 at the current funding level. Additional funding for monitoring is anticipated if the project is accepted into the National NPS Watershed Projects Monitoring Program.

Stakeholders:

Dairymen and cattlemen
Missouri Department of Natural Resources
Missouri Department of Health
Public and Private Water Districts
Recreation and Tourism Industry
University of Missouri
U.S. EPA
U.S. Fish and Wildlife Service
U.S. Geologic Survey
USDA-NRCS, Cooperative Extension

Contact:

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Missouri Department of Natural Resources
Department of Environmental Quality
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FAX: (314) 751-9396

Walnut Creek Prairie Restoration Project

Size and location: Walnut Creek, located in Jasper County in central Iowa, drains a 7,900-hectare (19,500-acre) watershed and discharges into the Des Moines River.

Nature of EPA involvement: EPA has awarded 319(h) grant funds ($435,800) to provide overall monitoring project coordination and monitoring activities including sampling and analytical work. The project is a candidate for the National Nonpoint Source Watershed Projects Monitoring Program.

Organization that initiated project:

Iowa Department of Natural Resources/Geologic Survey Bureau

Major environmental problems:

- Sediment
- Suspended solids
- Nutrients
- Pesticides (including atrazine and alachlor) from croplands
- Elevated nitrate and bacterial levels in stream
- Declining fish communities.

Actions taken or proposed: This 4-year project will begin in FY95. The primary objective is to initiate a comprehensive, nonpoint-source monitoring project in the Walnut Creek watershed to quantitatively document the water quality improvements resulting from restoration of riparian and upland ecosystems and implementation of agricultural management measures for soil conservation and nutrient and pest management and to incorporate aspects of the monitoring activities and results into the Refuge's considerable education and demonstration efforts. The Walnut Creek Wildlife Refuge was established by Congress to restore native prairie/savanna, the rarest of North America's major natural landscapes, on an 3496-hectare (8,654-acre) area in the Walnut Creek watershed. Land within the refuge will be converted to prairie/savanna over a multiyear period. Lands remaining in row crop production during the restoration period will be required to implement specific agricultural best management practices (BMPs). In order to document the water quality improvements that result from this land use conversion, a comprehensive paired watershed monitoring program will be implemented using the adjacent Squaw Creek basin (4680 hectares/11,710 acres). The monitoring plan will utilize a combination of surface and ground water and aquatic ecosystem measurements to assess water quality improvements.

Stakeholders:

Iowa Department of Natural Resources/ Geological Survey Bureau
Iowa State University
Leopold Center for Sustainable Agriculture
University of Iowa Hygienic Laboratory
U.S. EPA
U.S. Fish and Wildlife Service
U.S. Geologic Survey
USDA Natural Resources Conservation Service
USDA Soil Tilth Laboratory

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Walnut Creek Watershed Project

Size and location: The Walnut Creek watershed is approximately 47 square kilometers (18 square miles) in size. It is located in central Iowa approximately 16 kilometers (10 miles) south of Ames, Iowa. Although the specific site where the place-based research is occurring is Walnut Creek, the goal is to regionalize results to at least the Western Cornbelt Plains Ecoregion, if not the entire Midwest.

Nature of EPA involvement: Walnut Creek is the primary location for EPA's Midwest Agrichemical Surface/Subsurface Transport and Effects Research (MASTER) program. The Walnut Creek watershed is a U.S. Department of Agriculture-Agricultural Resource Service Management Systems Evaluation Area (USDA-ARS MSEA) site. The USDA-ARS National Soil Tilth Lab oversees the site and is EPA's primary cooperator. MASTER is a multi EPA Laboratory Program involving the Ada, Athens, Corvallis, Duluth, and Las Vegas labs. (Management of MASTER is the responsibility of the Athens lab; however, since a project for this site was not included in the list, RSKERL-Ada prepared this summary, which is focused on Ada's involvement.)

Organization that initiated project:

U.S. EPA

Major environmental problems: Agricultural nonpoint source pollution. The research focus and/or environmental endpoint responsibilities of the EPA labs are:

- Ada - agrichemical fate, site characterization, modeling; ground water and soil quality
- Athens - system modeling; water quality
- Corvallis - terrestrial habitat quality and biotic diversity
- Duluth - aquatic habitat quality and biotic diversity
- Las Vegas - data base management and geographic information system (GIS); no specific endpoint responsibilities.

The goal is to holistically address the agricultural pollution problem by focusing on both the chemical and ecological aspects at a specific location that typifies the situation in the western cornbelt.

Actions taken or proposed: All laboratories including the Tilth Lab are preparing an assessment of the situation at Walnut Creek. Discussion of the effects on the environmental endpoints of various options to alleviate the problems are included as part of the assessment. After the assessment is completed, the plan is to implement, in conjunction with the Tilth Lab, the most feasible and promising options. In addition, while the assessment is being performed each lab is conducting both in-house and extramural research projects. RSKERL-Ada is conducting research on ground water modeling at the regional scale, development of a soil quality index, the fate of pesticides in soil and ground water, the fate of nitrate in the deeper subsurface, and ground water/surface water interactions.

Stakeholders:

Agricultural community
General public
U.S. Department of Agriculture
U.S. EPA Region VII
U.S. Geological Survey

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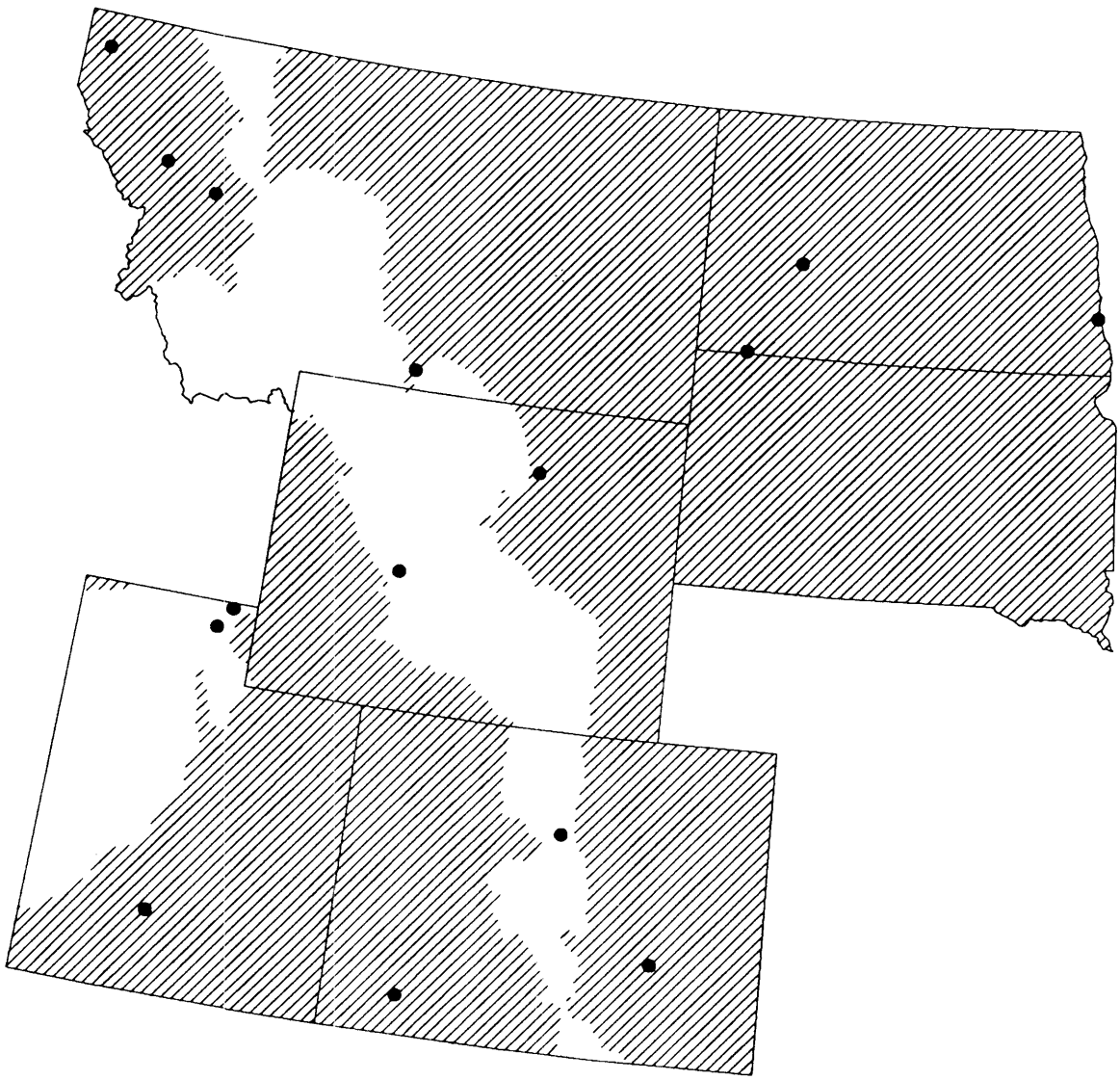
Figure 9:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 8 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale proj

State Boundary

Scale 1:10,000,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-8/10
Area boundaries and reference point locations are approximate.

Region VIII Projects

Example projects submitted by Region VIII include the 15 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on watersheds of rivers and creeks. Mining impacts, excessive water withdrawals, soil erosion, riparian and wetland degradation, heavy metals, sedimentation, nutrients and eutrophication, silvicultural and grazing impacts, livestock waste, and pesticide contamination are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the Colorado Plateau Ecosystem Partnership Project, the Colorado River Program, the Great Plains Initiative, the Prairie Pothole Region Ecosystem Assessment, and the Prairie Potholes/Missouri Coteau Ecoregion Assessment.

Region VIII projects in the Inventory at this time include:

Animas River Basin Watershed Project, CO
Bear River, ID, UT, WY*
Blackfoot River, MT
Bowman-Haley Reservoir, ND
Chalk Creek, UT
Clark Fork-Pend Oreille Watershed, ID, MT, WA*
Clear Creek, CO
Goodman Creek, ND
Kootenay River, ID, MT, British Columbia*
Little Bear River, UT
Otter Creek, UT
Red River Watershed, ND
Squaw Creek and Baldwin Creek, WY
Upper Arkansas River, CO
Upper Clark Fork Basin, MT

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Animas River Basin Watershed Project

Size and location: The Animas Basin headwaters originate in the San Juan Mountains of southwestern Colorado. The major towns in the watershed are Silverton and Durango.

Nature of EPA involvement: EPA provides technical assistance and monetary support through the Rocky Mountain Headwaters Initiative and through the Nonpoint Source Program. Technical assistance has also been provided on setting water quality standards as goals and ground water monitoring.

Organizations that initiated project: The organizations that initiated this collaborative effort were a local stakeholder group, the Colorado Water Quality Division, and the Colorado Center for Environmental Management. The local group is supported by a resource group of federal and state agencies participating in the local watershed group.

Major environmental problems: Major environmental problems result from past mining activities in the basin, growth problems which include major section 404 actions, coal bed methane problems in drinking water, and recreation.

Actions taken or proposed: Numerous actions have been taken, and more are proposed.

- The Division of Wildlife is investigating substrate and other habitat limitations to aquatic life.
- Cooperative sampling is being conducted by industry, environmental groups, State of Colorado, Forest Service, Bureau of Land Management, Bureau of Mines, Bureau of Reclamation, U.S. Geological Survey, and EPA to target problem areas within the watershed for special projects.
- A local coordinator was hired to help facilitate efforts and to provide a local clearinghouse for information.
- Feasibility studies for five targeted mine site remediation areas will take place this summer. One mining company is taking on a nonpoint source demonstration on how to clean up abandoned mines.
- Water quality standards were revised, setting current ambient standards with goal water quality standards in place within 3 years.
- A bibliography of all available data and studies was compiled by the Bureau of Mines.
- The Corps of Engineers has identified this area as a special study area.
- Investigation of funding sources for possible clean-up actions.
- Pilot study for regulatory policy options.

Stakeholders:

Colorado Center for Environmental Management
Colorado Department of Public Health and Environment
Colorado Division of Wildlife
Colorado Division of Minerals and Geology
Colorado Department of Natural Resources
Colorado Geological Survey
Concerned Citizens
Durango Water Department
Friends of the Animas River
La Plata County
Oak Ridge National Laboratory
San Juan County
Sunnyside Mining Company
Southwest Water Conservancy District
Sierra Club
Silver Wing Mining
Shenandoah Mining
Tusco
U.S. Bureau of Mines
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Department of Agriculture Forest Service
U.S. EPA
U.S. Geological Survey

Animas River Basin Watershed Project

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Bear River

Size and location: The Bear River has a 19,700-square-kilometer (7600-square-mile) watershed located in Wyoming, Utah, and Idaho.

Nature of EPA involvement: EPA has provided technical assistance, funding, and participation in coordination committees.

Organization that initiated project:
Utah Division of Water Resources

Major environmental problems:

- Soil erosion, increased sediment loadings, coliforms, and high nutrient loadings due to animal feeding operations, dairies, urban development, roads, oil and gas exploration, and silviculture
- Riparian vegetation removal
- Stream channelization
- Degraded stream channels and stream banks

Actions taken or proposed: Interest in increasing the use of the river as a drinking water source for the growing urban population in the lower basin and along the Wasatch Front prompted the Utah Legislature to enact the Bear River Development Act and fund a Bear River water development and management plan. The effort is to address both water development and water quality issues with a water quality plan that includes a broad-reaching analysis of pollutant loading to the river as well as chemical, biological, and physical habitat assessments. Because the Bear River encompasses Utah, Wyoming, and Idaho, a regional planning effort has been initiated. The purpose of the regional effort is to share information, coordinate planning efforts, and promote "grass roots" direction and participation. The Bear River Watershed Water Quality Coordination Committee is coordinating an array of water projects in the Bear River Basin initiated by different organizations and groups.

For example, the State of Utah, EPA, and the U.S. Department of Agriculture (USDA) initiated a watershed restoration project on the Little Bear River (one of the major tributaries in the basin), using funds from USDA and EPA. The project includes stream channel and riparian habitat restoration, land management, and animal waste treatment actions. Now under way in Wyoming are several additional nonpoint source projects aimed at restoring tributary streams that have been impacted by channelization, stream bank modification, and riparian habitat loss.

These "on-the-ground" demonstration projects are helping to generate enthusiasm for more cooperative efforts.

Stakeholders:
Bear Lake Regional Commission
Bear River Resource Conservation and Development Council
Idaho Division of Environmental Quality
Idaho Fish and Game Department
Local citizen groups
Natural Resources Conservation Service
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Division of Water Resources
Utah Division of Wildlife Resources
Utah Power and Light
Wyoming Department of Environmental Quality
Wyoming Game and Fish Department

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(801) 753-3871
FAX: (801) 753-4037

Blackfoot River

Size and location: The Blackfoot River has a 5930-square-kilometer (2290-square-mile) watershed located in western Montana and eastern Idaho. The watershed is 201 kilometers (125 miles) long.

Nature of EPA involvement: EPA has provided technical assistance as well as funding for a director's position and creation of a geographic information (GIS) system.

Organizations that initiated project:

Blackfoot Trout Unlimited
Clark Fork-Pend Oreille Coalition

Major environmental problems:

- Sedimentation from grazing and silvicultural activities
- Heavy metals from active and inactive mines
- Loss of riparian areas and instream habitat
- Recreational impacts

Actions taken or proposed: In 1991, the Blackfoot River Symposium was held. It established the Blackfoot River Challenge to promote cooperative resource management of the Blackfoot River, its tributaries, and adjacent lands. The symposium developed the following goals:

- Provide a forum for the timely distribution of technical and topical information from public and private sources.
- Foster communication between public and private interests to avoid duplication of efforts and capitalize on opportunities.
- Recognize and work with the diverse interests in the Blackfoot Valley to resolve issues and avoid confrontation.
- Examine the cumulative affects of land management decisions and promote actions that will lessen their adverse impacts in the Blackfoot Valley.

American Rivers listed the Blackfoot River as one of the top 10 most endangered rivers. Native char and native cutthroat trout are species of concern.

EPA funded a geographic information system project that will assemble the available information on the Blackfoot River into a usable format to facilitate watershed assessment and land use decisions. Meanwhile, private funds have been provided for a fisheries investigation report and a part-time facilitator. In addition, some ranchers are reducing cattle access to tributaries to reduce erosion and nonpoint source pollution. EPA has supported the restoration and monitoring of a tributary impacted by placer mining and channel straightening.

To date, activities have been limited to noncontroversial arenas. However, the coalition will continue to work together searching for solutions to more difficult issues over time.

Stakeholders:

ARCO
ASARCO
Blackfoot Trout Unlimited
Clark Fork-Pend Oreille Coalition
County Commissioners
Idaho Department of Fish and Game
Idaho Division of Environmental Quality
Landowners
Montana Department of Fish, Wildlife, and Parks
Montana Department of Health and Environmental Sciences
Montana Department of State Lands
Natural Resources Conservation Service
Phelps-Dodge
Plum Creek Paper
Recreationalists
The Nature Conservancy
Trout Unlimited
U.S. Bureau of Land Management
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service

Blackfoot River

Contacts:

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Mike Settevendemie, Executive Director
Blackfoot River Challenge
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(406) 244-5600

Bowman-Haley Reservoir

Size and location: Bowman-Haley Reservoir consists of a 123,000-hectare (304,000-acre) watershed located in southwestern North Dakota along the border between North and South Dakota.

Nature of EPA involvement: EPA has provided funding under section 319 of the Clean Water Act.

Organization that initiated project:
Bowman-Slope Soil Conservation District

Major environmental problems:

- Nutrients from grazing practices and feedlots
- Eutrophication
- Sedimentation from grazing practices and eroding streambanks
- Contamination from livestock waste

Actions taken or proposed: To improve water quality conditions in the reservoir, the Bowman Slope Soil Conservation District and Water Resource District Boards initiated a water quality improvement plan. At least 90 percent of the watershed is used for agriculture or recreation. The primary goal of the plan is to reduce wind and water erosion in the watershed by improving the management practices on over 50 percent of the agricultural lands in the watershed. The project objectives are:

- Develop resource management for over 50 percent of the agricultural lands in the watershed to reduce wind/water erosion and the transport of nonpoint source pollutants to the reservoir.
- Develop livestock waste management plans for the priority livestock concentration areas to reduce/eliminate runoff from these areas.
- Monitor water quality trends and track implementation of best management practices.
- Educate landowners/operators on the most effective land use technologies and management strategies that will protect/improve water quality.

The Conservation District is meeting the objectives by implementing an aggressive nonpoint source information/education campaign and providing financial and technical assistance to landowners to encourage voluntary implementation and conservation practices on their farm units. Participation by individual farmers in voluntarily implementing practices to improve water quality throughout the watershed has been high.

Stakeholders:

Agricultural Stabilization and Conservation Service
Bowman-Slope Soil Conservation District
Ducks Unlimited
Farmers
Harding County Conservation District
Natural Resources Conservation Service
North Dakota Department of Health
North Dakota Extension Service
North Dakota Game and Fish
Pheasants Forever
South Dakota Department of the Environment and Natural Resources
State Association of Conservation Districts
U.S. Environmental Protection Agency

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Local:
Kent Belland
Bowman-Slope Soil Conservation District
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Chalk Creek

Size and location: Chalk Creek has a 69,000-hectare (173,000-acre) watershed that is located 72 kilometers (45 miles) east of Salt Lake City, Utah.

Nature of EPA involvement: EPA has provided funding in support of this project.

Organizations that initiated project:

Utah Department of Environmental Quality
Utah Department of Agriculture

Major environmental problems:

- Sedimentation due to oil and gas construction sites, grazing practices, road construction, and loss of riparian vegetation
- Nutrients due to erosion and livestock concentrations
- Degrading stream channels and stream banks
- Loss of riparian vegetation
- Eutrophication of Echo Reservoir

Actions taken or proposed: Inventories have been completed for rangeland, forest, irrigated cropland, fisheries, stream and riparian areas, and wildlife. Alternative treatment plans have been developed for rangeland, irrigated cropland, and forest land.

The resource inventories and alternative treatment plans were used to complete a Coordinated Resource Management Plan (CRMP) for the watershed in 1994. The CRMP is a watershed management plan that represents consensus of all the stakeholders in the watershed. Watershed activities are coordinated by a Project Steering Committee, which was organized by the U.S. Department of Agriculture (USDA) and the local soil conservation district in 1991.

A project to demonstrate stream stabilization measures has been completed with Clean Water Act (CWA) section 319 funds. USDA provided the technical assistance. Now that the CRMP has been completed, USDA is accelerating work on development of conservation plans for individual landowners. Watershed treatment practices to stabilize stream channels and control pollutants from rangeland and irrigated pasture and hayland are in the initial phases of implementation. Funding is being provided through CWA section 319, the USDA Water Quality Incentive Program, and landowners. Information and education activities are also being carried out.

Stakeholders:

Citizens Dependent on Weber River for Drinking Water
Local governments
Local landowners
Summit Land Trust
U.S. Department of Agriculture
U.S. Environmental Protection Agency
Utah Association of Conservation Districts
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Division of Oil, Gas and Mining
Utah Division of Water Resources
Utah Division of Water Rights
Utah Division of Wildlife Resources
Weber Basin Water Conservancy District

Contact:

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Department of Environmental Quality
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FAX: (801) 538-6016

Clark Fork-Pend Oreille Watershed

Size and location: The Clark Fork-Pend Oreille Watershed covers 67,300 square kilometers (26,000 square miles) in Montana, Idaho, and Washington.

Nature of EPA involvement: EPA has provided funding and technical support for various projects in the watershed.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Nutrients from sources including irrigated agriculture, septic tanks, and municipal and industrial wastewater discharges
- Heavy metals from active and inactive mining and smelting activities

Actions taken or proposed: Section 525 of the 1987 Clean Water Act called for a comprehensive study of the sources of pollution in Pend Oreille Lake, the Pend Oreille River, and the Clark Fork River and its tributaries. Such an undertaking has required help from three states, two EPA regions, and the EPA Las Vegas Environmental Monitoring Systems Laboratory.

Using a range of technological tools, the study of the rivers feeding Lake Pend Oreille was linked with an analysis of the lake by a project team made up of the U.S. Geological Survey, the University of Idaho, the Panhandle Health District, the Eastern Washington University, the Bonner County Planning and Development Department, the Idaho Department of Environmental Quality, the Idaho Department of Fish and Game, and the EPA Las Vegas Environmental Monitoring Systems Laboratory.

Objectives of the project include:

- Control nuisance algae in the Clark Fork River and Pend Oreille River by reducing nutrient concentrations.
- Protect Pend Oreille Lake water quality by maintaining or reducing current rate of nutrient loading from the Clark Fork River and Pend Oreille River.
- Reduce near shore eutrophication in Pend Oreille Lake by reducing nutrient loading from local sources.
- Improve Pend Oreille Lake water quality through macrophyte management and tributary nonpoint source controls.

Actions include:

- Convene a Tri-State Implementation Council to implement the management plan recommendations.
- Establish a basinwide phosphate detergent ban.
- Establish numeric nutrient loading targets for the Clark Fork River, Pend Oreille River, and Pend Oreille Lake.
- Develop and maintain programs to educate the public on its role in protecting and maintaining water quality.
- Control Eurasian milfoil (a nuisance plant) by education, rotovation (a harvesting technique), and research into alternative methods of control.
- Install centralized sewer systems for developed areas on Pend Oreille Lake.
- Institute seasonal land application and other improvements at the Missoula wastewater treatment facility.
- Enforce existing regulations and laws consistently and aggressively, particularly state anti-degradation statutes.
- Establish and maintain a basinwide water quality monitoring network to assess effectiveness and trends and to better identify sources of pollutants.
- Develop and enforce storm water and erosion control plans and county ordinances.

In addition, Idaho received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Lake Pend Oreille and its watershed. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

Clark Fork-Pend Oreille Watershed

In 1993, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to a lake.

Stakeholders:

City of Butte
City of Deer Lodge
City of Missoula
City of Newport
Clark Fork Pend Oreille Coalition
Clean Lakes Coordinations Council
Idaho County Commissions
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Implementation Council
Intermountain Forest Industry Association
Intermountain Resources
Kalispill Indian Tribe
Kootenay Tribe of Idaho
Local citizens
Missoula City, County Health Department
Montana County Commissions
Montana Department of Fish, Wildlife and Parks
Montana Department of Health and Environmental Science
Montana Power Company
Natural Resources Conservation Service
Pend Oreille Conservation District
Steering Committee for the Tri-State Implementation Council
Stone Container
U.S. Environmental Protection Agency
U.S. Forest Service
University of Idaho
Washington Department of Ecology
Washington Department of Environmental Quality
Washington Water and Power

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FAX: (406) 444-1374

Local:
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Clark Fork-Pend Oreille Tri-State Implementation Council
206 N. 4th Ave., Suite 157
Sand Point, ID 83864
(208) 265-9092

Clear Creek

Size and location: The Clear Creek Watershed covers roughly 1550 square kilometers (600 square miles) and includes 5 counties and more than 13 communities. From the headwaters on the continental divide to the plains near Denver, Clear Creek connects small mountain communities with Colorado's largest metropolitan area.

Nature of EPA involvement: EPA has provided seed money for the project by hiring a local coordinator and sharing in the cost of several watershed projects.

Organization that initiated project: No one organization initiated the project, per se. It resulted from a critical mass of representative groups from industry, agencies, local organizations, and private citizens that joined together to protect Clear Creek.

Major environmental problems:

- Metal loadings from active and inactive mining sites
- Highway construction and maintenance runoff and direct spills to the creek from highway accidents
- Urban development and runoff
- Hydrologic modification
- Nutrient pollution from septic tanks and municipal point sources
- Erosion caused by construction for gambling growth
- Industrial discharges
- Leaking underground storage tanks

Actions taken or proposed: In 1983 the Clear Creek/Central City site was included on the Superfund National Priorities List. It is one of the largest Superfund study areas in the Nation, encompassing all of two counties in the upper watershed. Planned Superfund remedial actions and voluntary cleanups have played and will continue to play an important role in the restoration of the river. Specifically, they include Argo Tunnel water treatment plant, Burleigh Tunnel and man-made wetlands treatments, and private-party mine waste cleanups in Central City and Blackhawk.

A unique partnership was formed to address the McClelland Mine. Recently, through cooperative efforts of Superfund, Coors Brewing Company, the Colorado Department of Health, the Colorado Department of Transportation, Clear Creek County, and EPA's Mining Headwaters Initiative (each taking one part of the six-part project), a comprehensive restoration was accomplished. The capping of mine tailings and mine waste piles, treatment of a wetlands area, and boat ramp and trail installation transformed what was once a hazardous site into a county park.

Other actions taken in the watershed are:

- Emergency dial-down system to inform water users when spills have occurred in the Creek.
- Completion of the Bakersville to Loveland trail by Coors, the County, the Department of Transportation and the U.S. Forest Service.
- AMAX Henderson Mine water quality project.
- Reworking of old Urad mill tailings to reduce metal loadings.
- Guanella Pass road reconstruction.
- Bear Mine Project by the U.S. Bureau of Mines and the U.S. Forest Service.
- Idaho Springs stream restoration project.
- Formation of the North Clear Creek miniforum—a venue for small mountain communities to cooperate on environmental solutions.
- Gambling impacts projects for water quality protection and transportation improvement.
- Water supply environmental impact statement.
- Wetlands planning.
- City ordinances.
- Clear Creek Land Conservancy— Forest Stewardship Program.
- Jefferson County Open Space — acquisitions to protect water quality and stream corridors "Trails 2000 Plan.
- The Nature Conservancy mapping of endangered species, specifically the orchid Ute Ladies' Tresses (*Spiranthes diluvailis*).

- Clear Creek Canyon Action Plan—environmentally sustainable development plan for the central canyon area.
- Golden Gate Canyon—"Great Outdoors Colorado" State Park improvements.
- Colorado School of Mines freshman class EPICS—nonpoint source evaluations.
- Colorado School of Mines Research Institute—emergency cleanup of radioactive waste.
- City of Golden—water quality ordinances and enforcement.
- Riparian restoration of Clear Creek through Golden and Wheat Ridge by Coors.
- Clear Creek WIIN Newsletter and video.
- Clear Creek—I-76 joint land use plan by Arvada and Jefferson County with specific environmental performance standards.
- Standley Lake Agreement—comprehensive watershed management agreement for implementation of new water quality standards within the basin.
- Urban Drainage and Flood Control District—urban runoff water quality control and flood prevention projects.
- Division of Wildlife—Stream Watch Program.
- Adams County River Parks.

Many of these projects and programs were instigated or facilitated by the Clear Creek Watershed Forum, which was organized and attended by a diverse group of stakeholder interests. The Clear Creek Watershed effort is a model for ecosystem protection in Colorado. The water and the watershed through which it flows easily establish a sense of place for the citizens and a focus for efforts to protect the environment. Over 85 percent of the water is used as a drinking water supply for the metro area; therefore, the people of the lowlands have a special interest in remediation of the impacts of the past mining activities. Also, the enhancement and protection of natural areas for recreation have spawned several joint projects throughout the watershed.

Stakeholders:

Cities - Central City, Black Hawk, Empire, Silver Plume, Georgetown, Idaho Springs, Golden, Arvada, Westminster, Northglenn, etc.
Colorado Department of Public Health and the Environment
Colorado Department of Transportation
Colorado Division of Wildlife
Counties - Jefferson, Clear Creek, Gilpin
Denver Regional Council of Governments
Environmental groups - Clear Creek Land Conservancy, PAVE
Large and Small industries - Amax/Cyprus, Coors Brewery Company, Western Mobile Cooley Gravel
Local citizens
Professional organizations
Stanley Lake Users Group
U.S. Bureau of Mines
U.S. Environmental Protection Agency
U.S. Forest Service
U.S. Geological Survey
Upper Clear Creek Watershed Association

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Goodman Creek

Size and location: Goodman Creek has a 24,000-hectare (59,000-acre) watershed and is located in west-central North Dakota.

Nature of EPA involvement: EPA has provided funding under section 319 of the Clean Water Act.

Organization that initiated project:

Mercer County Soil Conservation District and Water Resource District

Major environmental problems:

- Nutrients from soil erosion
- Sediments from soil erosion and degraded riparian areas
- Contamination from livestock waste

Actions taken or proposed: The Mercer County Soil Conservation District is sponsoring and coordinating this project in rural North Dakota. The water quality of Goodman Creek should be improved by promoting improved land management and installing various best management practices (BMPs) that effectively reduce erosion on 60 percent of the agricultural lands within the watershed. These land treatment practices will focus primarily on managing crop residue and improving current grazing systems within the project areas. In addition, information on the positive impacts the implementation of various BMPs can have on water quality within a small watershed will be documented and disseminated. Water quality and land treatment data compiled during this project will be used to determine the correlation between land treatment and water quality improvements. Upon completion of this project, the data will be analyzed to evaluate the impact the project activities had on the water quality within the subwatershed and the cumulative effect subwatershed treatment can have on water quality within the large watersheds of North Dakota. Given the size of this project area, trends toward improved water quality should be nearly immediate and more easily documented than those in larger watersheds.

Stakeholders:

Individual farmers
Mercer County Soil Conservation District and Water Resource District
U.S. Environmental Protection Agency

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Kootenay River

Size and location: The watershed of the Kootenay River covers 49,000 square kilometers (19,000 square miles) in northwestern Montana, northern Idaho, and British Columbia.

Nature of EPA involvement: EPA provided funding for data collection in the watershed, an Adopt-A-Stream project, and to hire a professional facilitator.

Organization that initiated project:
Cabinet Resource Group

Major environmental problems:

- Threats from silviculture, hydropower, mining, and pulp mills
- Protection of species of special concern (white sturgeon and bulltrout)

Actions taken or proposed: The Kootenay River Network (KRN) has been formed and is composed of federal, state, tribal, provincial, industry, and citizen group representatives who are interested in the Kootenay River basin. The mission of the KRN is to involve stakeholders in the protection and restoration of the chemical, physical, and biological integrity of the waters of the Kootenay River basin. The goals are:

- Improve communication among government and tribal water resource management agencies and public and private interests for British Columbia, Idaho, and Montana.
- Pursue coordination of efforts and standardization of methods.
- Develop and implement a basinwide water quality monitoring program.
- Fully use monitoring information to accomplish proactive, scientifically based water resources management.
- Educate the public and solicit information about water resources issues.

EPA, the Bonneville Power Administration, Noranda Minerals, and Champion International funded the *Water Quality Status Report* (January 1994), which provides a history and description of the Kootenay River basin; discusses current water quality issues, development activities, and aquatic resources in the basin; gives an overview of past, present, and potential future environmental issues and problems in the basin; and makes recommendations for prioritizing the basin's water quality concerns and critical issues.

The KRN also received funding to have Adopt-A-Stream Foundation conduct a workshop to train 20 citizen volunteers in stream monitoring methods and implement a monitoring program. These volunteers, called Streamkeepers, are to train others as well. The KRN has also received funding for a professional facilitator.

Stakeholders:

British Columbia Ministry of Environment
Cabinet Resource Group
Champion International
East Kootenai Environmental Society
Idaho Department of Fish and Game
Idaho Division of Environmental Quality
Kootenay National Forest
Kootenay Tribe of Idaho
Kootenay Tribes of British Columbia
Montana Department of Fish, Wildlife, and Parks
Montana Department of Health and Environmental Sciences
Noranda Minerals Corps
Panhandle National Forest

Contact:

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Noxon, MT 59853
(406) 847-2228

Little Bear River

Size and location: The Little Bear River has a 77,600-hectare (192,000-acre) watershed located approximately 80 miles 129 kilometers (80 miles) north of Salt Lake City, Utah.

Nature of EPA involvement: EPA has provided funding and technical assistance in support of this project.

Organizations that initiated project:

Natural Resources Conservation Service
Utah Department of Environmental Quality
Local soil conservation district

Major environmental problems:

- Sediments
- Nutrients
- Erosion
- Runoff from dairies, feedlots, and irrigated cropland where animal wastes are frequently applied
- Poor riparian conditions
- Degradation of Hyrum Reservoir
- Degraded stream channels and stream banks

Actions taken or proposed: This watershed project is a coordinated effort involving funds from the U.S. Department of Agriculture (USDA) Hydrologic Unit Area Program, Clean Water Act (CWA) section 319, USDA Water Quality Incentive Program, Bureau of Reclamation, landowners, and a state revolving fund. A wide range of practices for stream stabilization, animal waste management, riparian restoration, and grazing and cropland management are being implemented. The project is also being coordinated with a CWA section 314 project to improve Hyrum Reservoir.

Stakeholders:

Lake users
Local citizens
Local soil conservation district
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Forest Service
Utah Association of Conservation Districts
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Department of Natural Resources

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Otter Creek

Size and location: Otter Creek has a 97,000-hectare (240,000-acre) watershed located approximately 322 kilometers (200 miles) south of Salt Lake City, Utah.

Nature of EPA involvement: EPA has provided funding in support of this project.

Organizations that initiated project:

Natural Resources Conservation Service
Utah Department of Environmental Quality
Local soil conservation district

Major environmental problems:

- Nutrients
- Sediment
- Degraded riparian areas and stream channel
- Stream bank erosion
- Erosion on rangeland
- Animal waste
- Eutrophication of Otter Creek Reservoir

Actions taken or proposed: This project is coordinating funding through the U.S. Department of Agriculture (USDA) Hydrologic Unit area, Clean Water Act (CWA) section 319, USDA Water Quality Incentive Program, U.S. Bureau of Land Management (BLM), U.S. Forest Service, and private sources. The Soil Conservation Service oversees this project, and a watershed project steering committee plays an active role in the project. Several water quality demonstration projects such as riparian and stream stabilization, rangeland brush control, and reseeding are under way or have been completed with technical assistance from USDA and BLM. This watershed restoration project includes treatment of both private and federal lands. Watershed treatment is also coordinated with a CWA section 314 project to improve Otter Creek Reservoir.

Stakeholders:

Local landowners
Local soil conservation district
U.S. Bureau of Land Management
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Forest Service
Utah Association of Conservation Districts
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Department of Natural Resources

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Red River Watershed

Size and location: The Red River Watershed is located in eastern North Dakota and western Minnesota. Part of the project area covers the Carmel, Homme, and Renwick subwatersheds in northeastern North Dakota, which total 119,720 hectares (296,332 acres). Another part of the effort on the Red River is focused on the southern part of the watershed near the cities of Fargo and Moorhead.

Nature of EPA involvement: EPA has provided funding under section 319 of the Clean Water Act and provided technical assistance.

Organizations that initiated project:

Red River Resource Conservation and Development Council
Pembina, Walsh, and Cavalier Soil Conservation Districts and Water Resource Districts
North Dakota Department of Health and Consolidated Laboratories

Major environmental problems:

- Eutrophication of Homme Reservoir due to agricultural practices
- Sedimentation of Red River and tributaries in northeastern North Dakota due to agricultural practices
- Ammonia and low dissolved oxygen due to wastewater treatment discharges in southeastern North Dakota
- Threats from agricultural practices to the Icelandic aquifer

Actions taken or proposed: The Red River Resource Conservation and Development Council (RC&D) initiated the watershed effort in the northeastern area of the watershed to reduce wind and water erosion on 80 percent of the agricultural lands in the subwatersheds. The RC&D annual nutrient and sediment loadings are expected to be lowered by implementing the following objectives and efforts, which are under way:

- Develop resource management plans for 80 percent of the lands in the subwatersheds.
- Implement an information and education program to educate the residents on the impacts of nonpoint source pollution and possible preventive measures.
- Document land use improvements and trends in water quality.
- Provide financial and technical assistance to producers to implement the resource management plans.
- Demonstrate best management practices to restore riparian zones that are under various agricultural uses such as cropland and livestock production.

The State of North Dakota joined with the U.S. Geological Survey (USGS) to model and verify conditions in the southern area of the Red River mainstem using QUAL2E. The data will be available by the end of 1994, but the work has so far produced a list of monitoring and modeling needs. A group of stakeholders has developed a coordinated, monthly synoptic in-stream monitoring plan to continue modeling efforts. In addition, the group is currently coordinating with several organizations to implement a project to observe the river's behavior in winter conditions when discharges take place under the ice during low flow.

The result of these studies will help determine the next pollution prevention actions. In the immediate future, actions will include the refinement of effluent limits from the cities' discharges. These limits will probably lead to upgrading wastewater treatment facilities. Possible future actions for consideration during the second phase of this effort include changing upstream dam operations and addressing nonpoint source pollution from surrounding agricultural use areas.

Stakeholders:

American Crystal Sugar
City of Fargo, North Dakota
City of Moorhead, Minnesota
City of Park River, North Dakota
Farmers
North Dakota Department of Health
North Dakota Game and Fish Department
North Dakota Parks and Recreation
Minnesota Pollution Control Agency

Pembina, Walsh and Cavalier Soil Conservation District and Water Resource District
Red River Resource Conservation and Development Council
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Geological Survey

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Squaw Creek and Baldwin Creek

Size and location: The watershed for Squaw Creek and Baldwin Creek covers 26,300 hectares (65,000 acres) in central Wyoming.

Nature of EPA involvement: EPA has provided funding as part of a cost-sharing effort in the project.

Organization that initiated project:
Popo Agie Conservation District

Major environmental problems:
- Ground water contaminated with pesticides
- Hydrological modification
- Severe sedimentation
- Surface water contaminated by coliform, nutrients, salinity, and pesticides
- Destroyed riparian areas resulting in loss of trout fishery
- Contaminated drinking water

Actions taken or proposed: The Conservation District has received Clean Water Act section 319 funding to work with nearly all of the 96 landowners in the watershed to implement best management practices (BMPs) through cost-sharing. The BMPs include proper grazing use, irrigation water management, pasture and hayland management, nutrient and pest management, wildlife upland and wetland habitat management, and stream improvements. An information and education program includes displays at the county fair, news releases, tours of the project area, workshops for teachers, a national award-winning demonstration area at Lander High School, and other activities.

Stakeholders:
Boy Scouts
City of Lander County Extension Service
Elementary and high schools
Landowners
Natural Resources Conservation Service
Popo Agie Conservation District
Students
U.S. Bureau of Land Management
U.S. Forest Service
Wyoming Department of Environmental Quality
Wyoming Fish and Game Department
Wyoming Outdoor Council

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Upper Arkansas River

Size and location: The watershed for the Upper Arkansas River covers 13,000 square kilometers (500 square miles) in central Colorado extending from the Continental Divide in Pike-San Isabel National Forest to Pueblo Reservoir where the plains meet the mountains.

Nature of EPA involvement: EPA provided initial leadership and continues to provide funding and technical assistance.

Organizations that originated the project:

U.S. Environmental Protection Agency
U.S. Bureau of Reclamation
Colorado Department of Health
Colorado Department of Natural Resources

Major environmental problems:

- Pollution from past mining practices
- Erosion of rangeland
- Loss of riparian and wetland areas
- Hydrologic modification
- Contaminated sediments

Actions taken or proposed: Many state and federal agencies are involved in a wide range of activities in the basin. In 1989, a technical workshop brought all people conducting research in the Upper Arkansas Basin together to inform each other of their work, discuss specific questions, and develop recommendations for further research in the basin. The overarching finding from this forum was that coordination among agencies had to be improved. At the same time, researchers from EPA developed a proposed management plan for research that would lead to a comprehensive understanding and remediation of water quality impacts from human disturbances, principally hard rock mining. The ongoing work, the workshop, and the management plan helped generate enthusiasm for more cooperative efforts, which culminated in a Memorandum of Understanding (MOU) among the Colorado Departments of Health and Natural Resources, the U.S. Bureau of Reclamation, and EPA, which, among other decisions, set a selfreproducing brown trout fishery as their biological remediation goal for the river.

In 1992, EPA formed a Regional Upper Arkansas Watershed Initiative Team to coordinate development and implementation of a watershed protection strategy for the Upper Arkansas Basin. A number of Clean Water Act section 319 nonpoint source projects were initiated at abandoned mining sites along Chalk Creek and St. Kevin's Gulch and on rangeland along Badger Creek. In addition, recently constructed metal treatment facilities will control two major draining mine discharges to the river, with an expected significant reduction in metals load to the mainstem of the river as a result of Superfund and water discharge compliance actions.

Local citizens are also active in the watershed. A local Resource Conservation and Development Council, with EPA funding support, hired a local teacher to serve as the on-site watershed coordinator for the initiative, and he has been rehired for a second year because of his successes. The on-site coordinator fosters cooperation among various stakeholders, solicits ideas for the strategy, and implements a public outreach program for the initiative. He coordinated a second MOU, which has the following goal: improve or maintain the aquatic ecosystem of the Upper Arkansas River Watershed. He coordinated the first watershed forum, focused on enhancing the awareness and knowledge of watershed citizens throughout the 242 kilometers (150 miles) of the river. The forum was planned and implemented with a steering committee of local interests. The evaluations showed it was highly successful and helpful in bringing information and a sense of watershed community to the participants. A volunteer monitoring program, with strong participation by local high schools, is active in the basin. This program, which was developed by the Colorado Division of Wildlife, based on its success in the Arkansas basin, is being implemented statewide.

The U.S. Bureau of Land Management (BLM) is conducting a water needs assessment for fish, recreationalists, and the riparian area of the mainstem. EPA's *Wetland Research Program* is supporting the development of a geographic information system, data base, and research project addressing hydrologic needs for the restoration of the wetland/riparian areas. The

U.S. Forest Service and BLM consider the Upper Arkansas a priority watershed and a potential demonstration project for ecosystem management through the Colorado Ecosystem Partnership.

Stakeholders:

ASARCO
Cities of Leadville, Buena Vista, Salida and Canon City
Colorado Association of Conservation Districts
Colorado Division of Minerals and Geology
Colorado Division of Parks and Outdoor Recreation
Colorado Division of Wildlife
Colorado Riparian Association
Colorado State Engineer's Office
Irrigation companies
Lake County Conservation District
Natural Resources Conservation Service
Sangre de Cristo Resource Conservation and Development Council, Inc.
Southeast Colorado Water Conservancy District
The Nature Conservancy
U.S. Bureau of Land Management
U.S. Bureau of Mines
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
Upper Arkansas River Recreation Task Force

Contact:

Jeff Keidel
P.O. Box 938
Buena Vista, CO 81211
(719) 395-6035

Upper Clark Fork Basin

Size and location: The Upper Clark Fork Basin consists of a 15,700-square-kilometer (6060-square-mile) watershed in western Montana.

Nature of EPA involvement: EPA has provided technical assistance through participation on the steering committee.

Organization that initiated project:
Montana State Legislature

Major environmental problems: Overappropriation of water, leading to dry reaches, elevated water temperatures, nuisance algae, low dissolved oxygen, and damaged fish habitat

Actions taken or proposed: The Montana State Legislature passed legislation calling for a moratorium in the issuance of most new surface water rights until June 30, 1995. The legislation created the Upper Clark Fork Steering Committee, which is charged with operating a water management plan that would consider and balance all beneficial water uses in the basin above Milltown Dam. By law, the plan must contain a recommendation concerning the water rights moratorium and identify and make recommendations for resolving water issues in the basin.

A planning process was developed following six public meetings throughout the basin. Six committees are to identify specific problems and potential solutions in various reaches of the basin and develop a dispute resolution process. The steering committee will integrate the information from the six committees into a coordinated, comprehensive management scheme.

Stakeholders:
Hydroelectric utilities
Irrigators
Montana Department of Fish, Wildlife, and Parks
Recreational and environmental groups
State and local water management agencies
U.S. Environmental Protection Agency
Water user groups

Contacts:

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Cogswell Building
Helena, MT 59620
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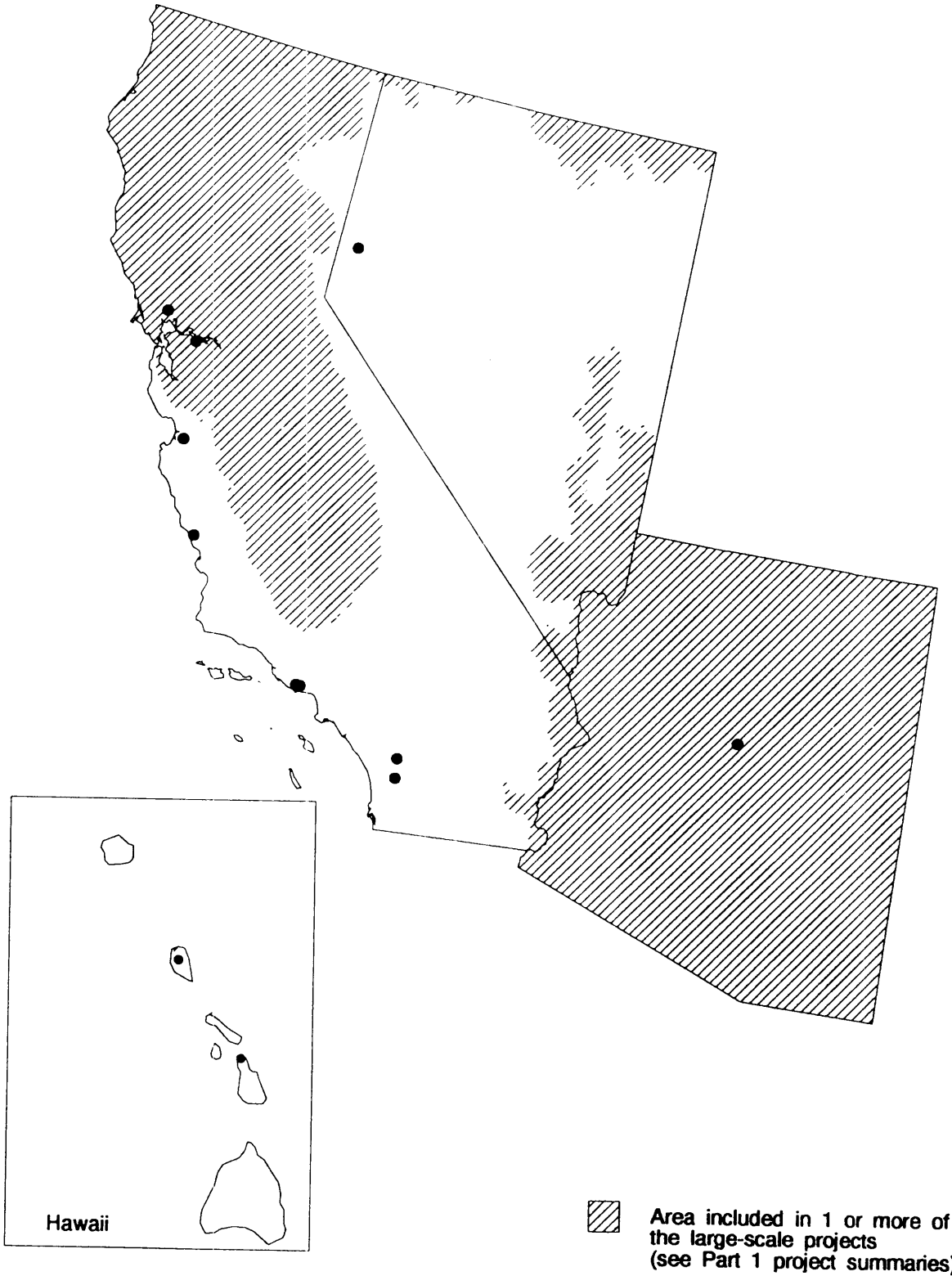
Figure 10:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 9 Project Locations



Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale project

State Boundary

Scale 1:8,750,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-9/10
Area boundaries and reference point locations are approximate.

Region IX Projects

Example projects submitted by Region IX include the 12 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. Many are based on river basins and coastal bays. Overgrazing, erosion, nonpoint source problems from urban and agricultural areas, pesticides, declines in anadromous fish stocks, excessive water withdrawals, endangered species issues, point source control, habitat degradation and loss, riparian zone degradation, pathogens and toxics, and grazing, silvicultural, and mining impacts are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Project, the President's Forest Plan for the Pacific Northwest, the Colorado Plateau Ecosystem Partnership Project, and the Colorado River Program.

Region IX projects in the Inventory at this time include:

Ala Wai Canal, HI
Elkhorn Slough, CA
Klamath Basin, CA, OR*
Malibu Creek, CA
Morro Bay, CA
Oak Creek Watershed, AZ
San Luis Rey River, CA
Santa Margarita River, CA
Santa Monica Bay, CA
Truckee River, CA, NV
Verde River Advance Identification (ADID) Project, AZ
West Maui Watershed, HI

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Ala Wai Canal

Size and location: Ala Wai Canal watershed is located on the southern coast of the island of Oahu, Hawaii, and includes most of Waikiki. The watershed covers about 42.4 square kilometers (16.3 square miles).

Nature of EPA involvement: The project is supported by the following grants: a 604(b) grant for partial funding of a coordinator position at Hawaii Department of Health (DOH), 106 surface water funding for the development of biocriteria for three Ala Wai canal tributaries, 319 discretionary funds to partially fund a citizen volunteer monitoring project, and 106 ground water funding for a wellhead protection project. Future funding is being sought through 319 grants for watershed restoration and education work and 104(b)(3) grants to fund an intermittent Intergovernmental Personnel Agreement (IPA) position to work on Ala Wai issues.

Organization that initiated project:
Hawaii Department of Health

Major environmental problems:
- Coliform bacteria
- Nutrients
- Sediment
- Pesticides
- Litter and garbage dumping

Actions taken or proposed: The Ala Wai Canal is a man-made estuary that separates the tourist destination of Waikiki from the rest of the island. The watershed encompasses a variety of land uses including urban areas, residential neighborhoods, preservation lands, agriculture, and three stream systems. A DOH internal working group has formed to integrate and coordinate Ala Wai Canal watershed protection efforts. Initially, the project will focus only on water programs, and it may expand later to include waste and toxics programs. Although DOH at present has the lead on the effort, it is envisioned that Ala Wai Canal coordination will be transferred to a community-funded effort within a few years. Thus, important short-term tasks will include public outreach and participation efforts, development of a broad Ala Wai Canal watershed advisory/stakeholder group, and legislative support for bills or resolutions that may have an impact on the watershed.

Stakeholders:
Department of Land and Natural Resources (HI)
Hawaii Department of Health
Iolani and Punahou schools
Local interest groups, landowners, rowing clubs, businesses
Natural Resources Conservation Service
University of Hawaii at Manoa
U.S. Environmental Protection Agency

Contact:
Kelvin Sunada
Hawaii Department of Health
Environmental Planning Office
P.O. Box 3378
Honolulu, HI 96801
(808) 586-4337

Elkhorn Slough

Size and location: Elkhorn Slough winds between Santa Cruz and Monterey, California, covering a distance of approximately 11 kilometers (7 miles). Its watershed encompasses 1010 hectares) 2500 acres of salt marsh, mudflat, and tidal channels and is the largest wetland in central California.

Nature of EPA involvement: The project is supported by the following grants: a 604(b) grant for planning innovative watershed management planning approach and 319(h) and Near Coastal Waters grants that support implementation of innovative agricultural pollution prevention practices focusing on pesticide use reduction. Staff support consists of limited technical and organizational assistance, partly through an Intergovernmental Personnel Agreement (IPA) that supports Elkhorn Slough activities related to the Monterey Bay Marine Sanctuary Project.

Organization that initiated project:

Elkhorn Slough Foundation

Major environmental problems:

- Overgrazing
- Erosion
- Nonpoint source pollutants
- Pesticide runoff

Actions taken or proposed: EPA is funding several projects to demonstrate the restoration of native vegetation on formerly overgrazed lands in this coastal watershed and to implement nonpoint source best management practices. In addition, the project includes a survey of restoration needs and livestock impacts in the Elkhorn Slough watershed (the Slough).

Many entities are carrying out projects at Elkhorn Slough. The Slough is a National Estuarine Research Reserve, designated by the National Oceanic and Atmospheric Administration, and is managed by the California Department of Fish and Game. The California State Water Resources Control Board is managing a Clean Water Act section 604(b) project studying runoff from strawberry fields. The Nature Conservancy recently purchased a large parcel near the site of this project and is planning restoration efforts.

The Elkhorn Slough Foundation, a nonprofit environmental organization focusing on restoration of the watershed, is receiving assistance for surveys and educational activities from Moss Landing Marine Laboratory graduate students. Additional funds to augment aerial photo costs have also been acquired.

Stakeholders:

California Coastal Commission
California Coastal Conservancy
California Department of Fish and Game
California Regional Water Quality Control Board
California State Water Resources Control Board
Elkhorn Slough Foundation
Local farmers
Local governments
Local industry
Moss Landing Marine Lab
National Oceanic and Atmospheric Administration
The Nature Conservancy
University of California-Santa Cruz
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Klamath Basin

Size and location: The Klamath Basin ecosystem covers an area of 20,700 square kilometers (8003 square miles) in south-central Oregon and northwestern California. In Oregon, the basin covers 14,700 square kilometers (5676 square miles) primarily in Klamath County, with smaller areas in Jackson, Josephine, and Lake Counties. Three river systems in the Upper Klamath Basin discharge to Upper Klamath Lake, including the Wood, Williamson, and Sprague Rivers. The Upper Klamath Lake is a large, shallow lake (36,360 hectares/90,000 acres, 2.4-meter/7.9- foot average depth).

Nature of EPA involvement: EPA has provided the following grants: a 319(h) grant for agricultural best management practice implementation in high-priority tributary watersheds and establishment of a comprehensive geographic information system (GIS) watershed data base (with training and equipment for use at local level; Clean Lakes Water Quality Assessment grant funds for the Klamath Tribe Fish and Wildlife Section to complete a water quality study of Upper Klamath Lake; 104(b)(3) total maximum daily load (TMDL) mini-grant for TMDL development and staff; and 319 grants that fund state staff working intensively in the basin. EPA staff have provided technical assistance in the development of watershed assessments related to FEMAT (the President's Forestry Initiative), coordinating cross-state communication.

Organizations that initiated project:

The Klamath Tribe
U.S. Fish and Wildlife Service

Major environmental problems:

- Habitat degradation resulting in the listing of two endangered species—Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*)
- Water quality degradation and degradation of wildlife habitat caused by traditional forestry practices including large areas of clear-cuts
- Declines in anadromous fish populations including the chinook salmon due to elevated temperature, sedimentation, and blockage of migration pathways
- Excessive upstream withdrawals, resulting in low river flows over the past several years
- Diversion of 61,650 hectare-meter (500,000 acre-feet) of water in the Upper Klamath Basin to irrigate 90,900 hectares (225,000 acres) of hay, potatoes, and sugar beets
- Loss of wetlands to agricultural uses (a conversion that has been linked to water quality and riparian degradation and wildlife habitat destruction)
- Point source discharges
- Questionable application of toxic chemicals, including pesticides, that have the potential to affect salmonids, endangered species (fish and wildlife), and nontargeted aquatic invertebrates

Actions taken or proposed: The Department of the Interior has formed the Klamath Basin Ecosystem Restoration Office. This office is staffed by both the Bureau of Reclamation and the U.S. Fish and Wildlife Service and is based in Klamath Falls, Oregon. The Bureau of Land Management purchased the Wood River Ranch, a significant land acquisition adjacent to the Wood River at the north end of Agency Lake.

A Technical Advisory Committee (TAC) has been formed to discuss and evaluate all studies currently under way in the Klamath Basin. TAC members include federal, state, and local agency personnel.

Several state and federal agencies have initiated an investigation of the application of toxic chemicals, including pesticides, that have the potential to affect salmonids, endangered species, and aquatic invertebrates.

Stakeholders:

Bureau of Land Management
Bureau of Reclamation
City of Klamath Falls plus other point source dischargers
Hunting groups
Klamath Tribe
Local ranchers/farmers

Nonconsumptive resource users
Several tribes in California
Sport and commercial fishing interests
Timber interests
U.S. Fish and Wildlife Service

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Craig Bienz, Chief Biologist
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Michael Ryan
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Malibu Creek

Size and location: Malibu Creek is located northwest of Los Angeles, California. The creek and its watershed span approximately 282 square kilometers (109 square miles).

Nature of EPA involvement: The project is supported by the following grants: a Near Coastal Waters grant for stream restoration and a 604(b) planning grant for a coordinator position. Staff support consists of limited participation in project planning, coordination with the Natural Resources Conservation Service (watershed modeling work), and support through the Santa Monica Bay Restoration Project.

Organizations that initiated project:

Santa Monica Bay National Estuary Program
Topanga-Las Virgenes Resource Conservation District

Major Environmental Problems:

Water quality and quantity
Habitat loss
Urban runoff
Confined animal runoff
Wastewater discharge
Accelerated sediment loadings
Nutrients
Coliform/pathogens

Actions taken or proposed: Efforts to protect this watershed have been under way since the 1970s and were accelerated recently when the Santa Monica Bay Restoration Project, the local National Estuary Program, identified the watershed as one of the major contributors of pollution to the bay. These efforts were augmented by the Local Resource Conservation District, which requested and received watershed planning assistance through the U.S. Department of Agriculture's Small Watershed Program (resulting in a Natural Resources Plan study) and by the state. Because the lagoon is not meeting state water quality standards, the state targeted it for early action in developing total maximum daily loads and waste load allocations.

Project efforts resulted in a watershed plan with 111 agreed-upon recommendations, which since have been consolidated into 44 actions. The stakeholder group has formed an implementation committee, the Malibu Creek Watershed Advisory Council, to carry out these actions. EPA will work with the state and local stakeholders to identify funds for implementation. The Resource Conservation District recently received a Clean Water Act section 319 grant to address confined animal runoff and to restore a section of stream bank in the watershed that was damaged by development. With EPA's assistance, the stakeholder group is developing a comprehensive watershed monitoring plan.

Stakeholders:

California Fish and Game
California Parks and Recreation
California Regional Water Quality Control Board
California State Coastal Commission
Coastal Conservancy
Environmental groups
Local dischargers, developers, and homeowner groups
Local municipal governments
Local Resource Conservation District
Santa Monica Bay Restoration Project
Surfer groups
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Ventura and Los Angeles Counties

Contacts:

Heather Trim
Los Angeles Regional Water Quality Control Board
101 Centre Plaza Drive
Monterey Park, CA 91754-2156
(213) 266-7500

Morro Bay

Size and location: Morro Bay has an approximately 259-square-kilometer (100-square-mile) watershed located on the California coast, about 242 kilometers (150 miles) north of Los Angeles.

Nature of EPA involvement: The project is supported by the following grants: 319 grants for agricultural and grazing BMP implementation projects, special 319 grants for nonpoint source (NPS) national monitoring project (long-term project to study the effectiveness of NPS controls), 604(b) planning grants, 319 funding for state staff coordinators, and a Near Coastal Waters grant for NPS controls.

Organizations that initiated project:

California State Coastal Commission
Central Coast Regional Water Quality Control Board
Natural Resources Conservation Service

Major environmental problem:

- Sedimentation

Actions taken or proposed: To protect this endangered area, EPA supports the Morro Bay Watershed Project with both funding and technical guidance concerning nonpoint source monitoring and implementation of nonpoint source controls. Clean Water Act section 319 grant funds are being used to implement erosion control and sediment retention practices on several farms and ranches in the watershed. A National Nonpoint Source Monitoring Program project measures the effectiveness of agricultural and silvicultural best management practices in reducing sedimentation. In addition, the Regional Water Board has initiated an effort to closely coordinate implementation of other water quality programs, including underground tank remediation, storm water, and point source permitting on a watershed basis.

Stakeholders:

California Polytechnic Institute-San Luis Obispo
California Regional Water Quality Control Board
California State Coastal Commission
Local interest groups and landowners
Resource Conservation District
Natural Resources Conservation Service
U.S. Environmental Protection Agency

Contact:

Howard Kolb
Central Coast Regional Water Quality Control Board
81 Higuera Street, Suite 200
San Luis Obispo, CA 93401-5414
(805) 549-3332

Oak Creek Watershed

Size and location: Oak Creek Watershed covers 1106 square kilometers (427 square miles) in Arizona.

Nature of EPA involvement: The project is supported by the following grants: 319 grants for nonpoint source (urban runoff and recreation) BMPs, special 319 grant for NPS national monitoring project, 319 funding for state staff providing watershed project coordination. Staff support consists of assistance in the design of national monitoring program and NPS projects, TMDL review, and NPDES permit issues.

Organization that initiated project:

Arizona Department of Environmental Quality

Major environmental problems:

- High bacteria levels
- High nutrient levels
- Sedimentation

Actions taken or proposed: The Arizona Department of Environmental Quality initiated the Oak Creek project to provide an analytical, planning, and implementation framework to address water quality problems associated with point and nonpoint pollutant discharges. Oak Creek was selected as a National Nonpoint Source Monitoring project site for long-term monitoring and assessment of the effectiveness of nonpoint source best management practices. A variety of practices to control runoff from paved surfaces will be implemented.

Stakeholders:

Arizona Department of Environmental Quality
Arizona Department of Transportation
Local county government
Local environmental groups and landowners
Northern Arizona Council of Governments
U.S. Department of Agriculture
U.S. Environmental Protection Agency

Contact:

Chris Heppe
U.S. EPA Region IX
75 Hawthorne Street
San Francisco, CA 94105
(415) 744-2009
FAX: (415) 744-1078

San Luis Rey River

Size and location: The San Luis Rey (SLR) River is located in San Diego County in California.

Nature of EPA involvement: The project is supported by the following grants: 104(b) wetlands grants for comprehensive watershed planning and management and 604(b) grants for watershed planning.

Organizations that initiated project:

U.S. Environmental Protection Agency
San Diego County Board of Supervisors

Major environmental problems:

- Sand and gravel-mining operations
- Agricultural activities
- Urban development
- Impaired streams and riparian areas

Actions taken or proposed: The California Coastal Conservancy, the San Diego County Department of Parks and Recreation, and the San Diego County Planning Department are working together to develop a Multi-objective River Corridor Management Plan for long-term management of the San Luis Rey River. The goals for this plan include better coordination of enforcement, restoration, and development activities for maximization of wetlands protection and enhancement. In addition, EPA's Wetlands Research Program is sponsoring research to develop approaches for identifying and prioritizing sites for ecosystem restoration.

San Diego County is involved in coordinating the many interest groups and public agencies in the area. A Technical Advisory Committee and a Citizens Advisory Committee have been formed to oversee development of the Management Plan. A consultant is working on a resource inventory and an opportunities and constraints analysis to be used as the basis for development of the Management Plan. The County has completed for the participating agencies' signature a Memorandum of Understanding that outlines the agencies' commitment to the project.

Stakeholders:

California Department of Fish and Game
California Department of Transportation
California Division of Mines and Geology
California State Coastal Conservancy
City of Oceanside
Pala, Pauma, La Jolla, and Rincon Indian Tribes
Rainbow, San Luis Rey, and Yuima Municipal Water Districts
San Diego Area Council of Governments
San Diego County Department of Parks and Recreation
San Diego County Planning Department
San Diego County Rock Producers Association
San Diego County Water Authority
San Diego Farm Bureau
San Diego Gas and Electric
San Diego Regional Water Quality Control Board
Upper San Luis Rey Resources Conservation District
U.S Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

Contact:

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Santa Margarita River

Size and location: The Santa Margarita River has a 1920-square-kilometer (740-square-mile) coastal watershed and is located in Riverside and San Diego Counties in California.

Nature of EPA involvement: The project is supported by the following grants: 319(h) for best management practices (BMP) implementation to address nutrient runoff from orchards and 104(b) wetlands grant for watershed planning. Staff support consists of a regional lead on advanced identification for 404 planning, a part-time staff coordinator, an intensive staff-level workgroup to coordinate all EPA activity by multiple programs (especially National Pollutant Discharge Elimination System (NPDES), groundwater protection, monitoring, and nonpoint source), and participation in the local watershed management planning process.

Organizations that initiated project:

Riverside and San Diego Counties
California State Coastal Conservancy
U.S. Environmental Protection Agency

Major environmental problems:

- Endangered wetland and riparian habitat
- Flooding
- Development pressures
- Impacts from channelization of tributaries
- Wastewater and storm water discharges
- Nonpoint source discharges
- Hazardous waste sites

Actions taken or proposed: The California State Coastal Conservancy, in cooperation with Riverside and San Diego Counties, is developing an integrated watershed management plan for the Santa Margarita River watershed. This planning effort will take a watershed protection approach to the long-term preservation of important wetland and riparian habitats, particularly in the estuary and the Santa Margarita River floodplain. Flood control and development engineering design criteria that focus on the maintenance of hydrologic balance and riparian and creek values in both the upper basin and the lower reaches of the watershed will be formulated. An economic analysis of alternative flood control and development design criteria will be conducted.

A watershed policy committee, consisting of representatives of Riverside and San Diego Counties, Temecula, Murrieta, and Camp Pendleton, has been established. Three subcommittees—the Recreation, Open Space and Wildlife Habitat Subcommittee; the Water Quality and Supply Subcommittee; and the Flood Control and Land Use Subcommittee—have also been created.

EPA will coordinate Superfund activities (including an ecological assessment and remediation of Superfund sites along the Santa Margarita River), NPDES and 404 permit review, grant funds, the implementation of Region IX's Effluent-Dependent Streams guidance, and other applicable water quality standard issues in the watershed.

A technical framework for evaluating wetland functions in the watershed is being developed. This framework will be consistent with the hydrogeomorphic approach being developed by a task force of scientists under the auspices of the Wetlands Research Program at the U.S. Army Corps of Engineers. Also, a wetlands advance identification planning project that identifies aquatic sites within the Santa Margarita River watershed and evaluates whether they are suitable for possible future disposal sites for the discharge of dredge and fill material is being conducted. This project will augment the planning effort for the Santa Margarita River that has recently been initiated by Riverside and San Diego Counties with the assistance of the National Park Service's Rivers, Trails, and Conservation Assistance program.

Research to support local community planning has been initiated by EPA's Office of Research and Development in coordination with the Biodiversity Research Consortium and the Department of Defense. The study will examine the effect on regional biodiversity of various scenarios of urban growth.

Other activities include:

- Developing a data base that can serve as a focal point for enhancing all the

water programs in the watershed.

- Conducting a source assessment based on existing information for nutrients and sediments and setting target reduction goals.

Stakeholders:

California State Coastal Conservancy
Camp Pendleton
Local citizens
Murrieta County
National Park Service
Riverside and San Diego counties
State of California
Temecula County
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency

Contact:

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Santa Monica Bay

Size and location: The Santa Monica Bay Restoration Project (SMBRP) stretches from the Ventura County line to Point Fermin at the southernmost tip of the Palos Verdes Peninsula, covering approximately 80 kilometers (50 miles) of coastline. Santa Monica Bay's watershed covers 1072 square kilometers (414 square miles).

Nature of EPA involvement: The project is supported by the following grants: National Estuary Program (NEP) planning grants, 604 planning grants focused on Malibu Creek, a 319 grant for public education and outreach programs, and a 104(b) National Pollutant Discharge Elimination System (NPDES) project to begin coordinating planning and permit issuance by watershed. Staff support consists of extensive input to the NEP process and senior management participation on steering committees.

Organizations that initiated project:

U.S. Environmental Protection Agency
California State Water Resources Control Board

Major environmental problems:

- Impairment of water quality primarily due to urban runoff and other nonpoint source pollution
- Public health issues associated with swimming and consuming seafood
- Loss and degradation of habitats/-ecosystem

Actions taken or proposed: The Santa Monica Bay was selected for inclusion in the National Estuary Program in 1988. In May 1994 the SMBRP released for public comment a Comprehensive Conservation and Management Plan (CCMP) that identifies actions necessary for bay restoration and protection. It is entitled the Santa Monica Bay Restoration Plan. The plan, which focuses primarily on controlling urban runoff and other diffuse sources of pollution, contains nearly 250 actions. Of these, 73 have been identified as "priority actions." The plan provides a strategy for coordinating water pollution control on a watershed basis. The following are highlights of the plan:

- Establishment of a Santa Monica Bay Watershed Council.
- Implementation of a "mass emissions approach" to control discharge of toxic pollutants from both point and non-point sources more effectively.
- Reduction of hazardous waste from households and small businesses.
- Best management practices (BMPs) to improve the quality of urban/storm water runoff that enters the bay.
- Full secondary treatment of sewage at the treatment facilities of the City of Los Angeles and County Sanitation Districts.
- Assessment of swimming health risks and a plan to track down pathogen sources.
- Restoration and enhancement of priority wetlands and other sensitive marine, coastal, and upland habitats.
- Improved public education and involvement programs.
- Implementation of a comprehensive baywide monitoring program.
- Adoption of a comprehensive watershed planning and management strategy.

In addition to developing the CCMP, the SMBRP has undertaken a number of significant projects and programs that support and further the goals of bay restoration and protection. They include:

- Instituted a pilot program for treating storm drain runoff with ozone. (The City of Santa Monica and the University of California-Los Angeles Laboratory of Biomedical and Environmental Science showed that ozone is an excellent disinfectant.)
- Issued a Los Angeles County Storm Water National Pollutant Discharge Elimination System (NPDES) Permit that is unique in its emphasis on BMPs.
- Established new breeding sites for the California least tern, an endangered

species.

- Instituted a storm drain stenciling project to educate the public about the disposal of contaminants in storm drains. The project was funded by the SMBRP and carried out by various cities within the watershed and Heal the Bay (a local environmental group).
- Restored the Lower Zuma Creek wetland, lagoon, and sand dunes.
- Established a "mini-grants" program to provide funding for schools, inner-city youth, environmental groups, and municipalities to educate and involve the public in bay resource protection and pollution prevention efforts.
- Designed the first-ever epidemiological study of human health risk from contaminated runoff for the West Coast.
- Performed the first technical study to quantify pollutant loads associated with storm water runoff for the bay watershed.
- Conducted research on seafood contamination and analyzed the sportfish consumption patterns of local anglers.
- Conducted a study to identify and map remaining wetlands and riparian habitat in the watershed and identified several sites for possible restoration.
- Developed a comprehensive and coordinated monitoring program to provide insights into regional, cumulative, and long-term impacts; link public concerns with measurable indicators; and reduce costs associated with current monitoring practices.
- Developed the Santa Monica Bay Restoration Plan.

Stakeholders:

Area universities
Bay watershed cities (NPDES co-permittees)
Heal the Bay
Los Angeles County
National Oceanic and Atmospheric Administration
State Department of Fish and Game
State Department of Health Services
State Water Resources Control Board
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
USDA Natural Resources Conservation Service
University of California-Los Angeles Laboratory of Biomedical and Environmental Science

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Truckee River

Size and location: The 225-kilometer (140-mile)-long Truckee River runs from Lake Tahoe, California, into the saline Pyramid Lake in Nevada.

Nature of EPA involvement: The project is supported by the following grants: 319 grants for nonpoint source controls (urban runoff, agriculture) and public education activities (also with Pyramid Lake Paiute Indian tribe), 314 Clean Lakes grants for lake assessments (Tahoe and Pyramid) and several phase 2 implementation projects, 604(b) projects to plan watershed management in several tributaries and to develop standards for Truckee River and Pyramid Lake, and a special 104(b) grant for a supports coordinator for a lower river habitat restoration project. Staff support consists of a part-time EPA coordinator for over 5 years; participation in water quality/quantity negotiations; and extensive involvement in standards, total maximum daily load (TMDL), and permit reviews and ground water planning.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Water quality degradation
- Deterioration of aquatic habitat
- Threatened and endangered fish species

Actions taken or proposed: The flow of the Truckee River is highly regulated with most of the river water fully allocated via water rights. The U.S. Fish and Wildlife uses some of the water to induce spawning of the endangered fish cuiui and to provide drought relief. Approximately one-third of the river flow is diverted via a dam to Lahontan Valley to irrigate alfalfa and pastures. The watershed also supports the resort communities surrounding Lake Tahoe, the greater metropolitan area of Reno and Sparks, and the Pyramid Lake Paiute Indian Reservation.

The Pyramid Lake Paiute Tribe has taken numerous legal actions over the last 100 years to obtain legal compensation for the adverse impacts resulting from the water diversion to Lahontan Valley. Lake elevations have dropped 80 feet (24 meters), thereby restricting fish access for spawning. The Tribe also pressed for efforts to reduce pollutant loadings, to ameliorate elevated water temperatures, and to restore the water course.

EPA initiated the Truckee River Strategy to end litigation, and Senator Reid of Nevada facilitated a negotiated settlement accord through public law. EPA coordinates different program activities and agencies to focus restoration efforts on the Truckee River Strategy, a holistic watershed restoration program. In particular, EPA:

- Provides grant assistance to a Native American tribe and the states of Nevada and California to assess problems, to develop a water quality model, and to implement both nonpoint and point source controls.
- Oversees and approves the development of state water quality standards, total maximum daily loads, and storm water and treatment works permits.
- Funds a grant to explore alternative economic incentives to conserve water and improve water quality.
- Awarded a Clean Water Act section 319 grant to Nevada to establish a water bank that would allow residents to donate their water rights to the bank to be used for beneficial instream uses.

The Nevada Division of Environmental Protection has assumed the lead for the project and is currently coordinating the multiagency effort to protect and restore the river.

Stakeholders:

California Lahontan Regional Water Quality Board
Fenley Town Utilities
Lyon, Storey, and Washoe Counties in Nevada
National Park Service
Natural Resources Conservation Service
Nevada Cooperative Extension
Nevada Resource Conservative Service
Nevada Department of Wildlife
Nevada Division of Environmental Protection

Nevada Division of Transportation
Public Resource Associates
Pyramid Lake Paiute Tribe
Reno and Sparks municipal governments
Sierra Club
Sierra Pacific Power Company
The Nature Conservancy
Truckee River Advisory Board
U.S. Army Corps of Engineers
U.S. Bureau of Indian Affairs
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
University of California, Davis
University of Nevada, Reno
Washoe-Storey Conservation District

Contact:

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FAX: (415) 744-1078

Verde River Advance Identification (ADID) Project

Size and location: This wetlands planning project extends from Sullivan Lake to Horseshoe Reservoir, covering 201 kilometers (125 miles) of the Verde River in Yavapai and Gila Counties in Arizona. The ADID is a component of a watershed planning effort currently underway that will address a broader range of issues throughout the Verde River Basin, which covers 14,100 square kilometers (5450 square miles).

The Verde River has outstanding natural resources of local, regional, and national importance and is functioning, overall, as a high-value riverine system. The ADID area includes the following:

- The only river reach designated Wild and Scenic in the state
- Extensive stands of cottonwood-willow riparian gallery forest that support a high diversity of bird species
- Critical habitat for razorback sucker, proposed critical habitat for southwestern willow flycatcher
- Reintroduction sites for Colorado squawfish and razorback sucker
- Habitat for 31 special status species.
- Designated as Resource Category 1 by U.S. Fish and Wildlife Service (USFWS)
- Listed on Department of the Interior's National Rivers Inventory as one of the Nation's most significant free-flowing rivers
- State priority for river corridor planning.

Nature of EPA involvement: EPA entered into an Interagency Agreement (IAG) with USFWS to prepare a functional assessment of the Verde River riparian ecosystem. The functional assessment provided a technical basis for identifying "suitable" and "unsuitable" sites along the Verde River. A 104(b)(3) grant was awarded to the Arizona Geological Survey to map the alluvial deposits along the river. EPA provided staff support and funding for printing costs throughout the project. The watershed is a priority for nonpoint source implementation; several section 319 grants have been awarded in the area. EPA is also involved in National Pollutant Discharge Elimination System (NPDES) and 404 permitting and enforcement issues.

Organizations that initiated project:

U.S. Environmental Protection Agency
U.S. Army Corps of Engineers

Major environmental problems:

- Sedimentation from sand and gravel mining and hydrologic modification problems
- Polluted runoff from abandoned hardrock mines
- Bank stabilization
- Flooding
- Threatened and endangered species (including Razorback sucker and Southwestern willow flycatcher)

Actions taken or proposed: EPA and the U.S. Army Corps of Engineers (Corps) recently completed the ADID. The final ADID site identifications are described in an August 18, 1994, joint EPA-Corps public notice. The ADID identified potentially suitable sites for specific activities involving minor discharges of dredged or fill material that have minimal adverse effects on the river. All of the stream reaches within the ADID area are generally unsuitable for major discharges such as sand and gravel mining, stream channelization, and dredging projects. The ADID also identifies environmental criteria that, if incorporated, should expedite the permit review process.

Goals of the ADID are twofold:

- To achieve a net gain in the quality and quantity of the Verde River riparian ecosystem in terms of acres, functions, and values.
- To restore and maintain the physical, chemical, and biological integrity of the Verde River riparian ecosystem.

The objectives are to:

- Strengthen the Clean Water Act (CWA) section 404 wetlands permit and enforcement program through public outreach.

Verde River Advance Identification (ADID) Project

- Ensure compliance with CWA section 404 early in the planning process.
- Seek avoidance of placing fill in sensitive aquatic sites.
- Augment state and local efforts to develop a comprehensive riparian management plan for the Verde River.
- Encourage restoration efforts.

EPA and the Corps have conducted several public meetings to discuss the section 404 program and ADID, to present the results of the functional assessment of the Verde River, and to solicit public comments on options for identifying "suitable" and "unsuitable" sites along the river. Public workshops will be held to answer questions and clarify points.

The ADID involved considerable interagency coordination, a technical evaluation of the Verde River riparian ecosystem, and public input at various points throughout the process.

A couple of follow-up actions are anticipated. EPA intends to take the lead in developing guidance on the applicability of the agricultural exemptions under section 404(f) of the Clean Water Act, specifically to the construction and maintenance of agricultural diversion structures. The Corps is considering revoking and/or modifying the Nationwide Permit program for the Verde River to be consistent with the ADID guidance.

Camp Verde will soon fund a flood mitigation study in the Town of Camp Verde. The study will include determining the feasibility of channelizing West Clear Creek, a major tributary to the Verde River. Flood protection is a priority concern for the Town of Camp Verde because approximately 20 percent of the town is located in the floodplain.

The Verde Watershed Association and Arizona Department of Environmental Quality (ADEQ) are working with other local stakeholders to assess and remedy nonpoint runoff problems. In addition, EPA is evaluating potential environmental impacts associated with runoff from a mine tailing area and working with developers to avoid adverse impacts from a proposed development in this area.

Stakeholders: (partial list, 750 on mailing list)

Arizona Department of Environmental Quality
Arizona Game and Fish Department
Arizona State Parks
Audubon Society
Friends of the River
Irrigation Organizations
National Forest Service
National Park Service
Natural Resources Conservation Districts
The Nature Conservancy
Salt River Projects
Town of Camp Verde
Town of Clarkdale
Town of Cottonwood
Town of Jerome
U.S. Bureau of Reclamation
U.S. Fish and Wildlife Service
Verde Watershed Association
Yavapai County Planning Department
Yavapai County Flood Control District

Contact:

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San Francisco, CA 94105-3901
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FAX: (415) 744-1078

West Maui Watershed

Size and Location: This project consists of a series of small watersheds along a 26-kilometer (16-mile) stretch of coast on the island of Maui, Hawaii.

Nature of EPA involvement: The project is supported by the following grants: congressional line-item grants for a wide range of watershed assessment, planning, and pollution control projects; a 319(h) grant for sediment control projects; and various grants to support a full-time coordinator (EPA Intergovernmental Personnel Agreement (IPA)). EPA staff are conducting extensive work to draw attention to watershed issues, gain funding, and address nonpoint source and wastewater management issues (Underground Injection Control and National Pollutant Discharge Elimination System programs).

Organizations that initiated project:

U.S. Environmental Protection Agency
Hawaii Department of Health

Major environmental problems:

- Sediment runoff from agriculture and construction sites
- Nearshore turbidity
- Macroalgal blooms and nutrient runoff possibly associated with agricultural runoff, wastewater infiltration to surface waters, resorts, and urban areas

Actions taken or proposed: The algal problem was first brought to EPA's attention by four congressional inquiries in the fall of 1991. EPA responded by forming a Maui Algae Team to coordinate with the State of Hawaii Department of Health. This partnership drafted a strategy to mitigate the algal problem. The strategy is basically a comprehensive watershed management plan focusing on nutrient source controls within the watershed. EPA is also working with the Hawaii Department of Health, the County of Maui, and the National Oceanic and Atmospheric Administration on studies regarding the linkage between sewage injection wells, nutrient loading to the ocean, and source controls. EPA is funding a local watershed manager to facilitate assessment and planning of watershed protection activates in West Maui. Through this effort, the Mayor of Maui publicly committed to increased water reclamation and canceled plans for new sewage injection wells.

In addition, local sugar cane and pineapple farmers have begun implementing best management practices (BMPs) to reduce sediment and associated nutrient runoff from fields.

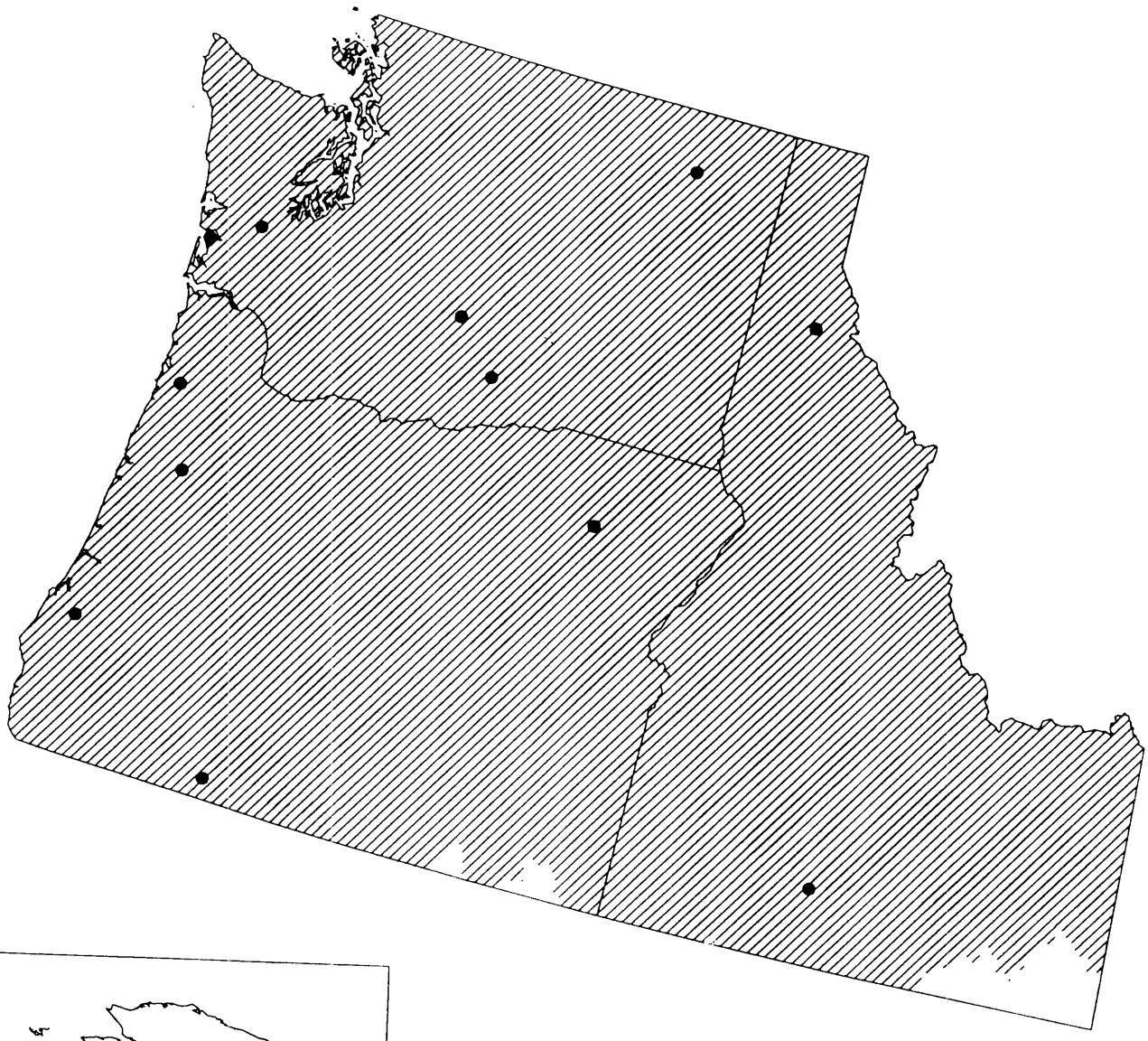
Stakeholders:

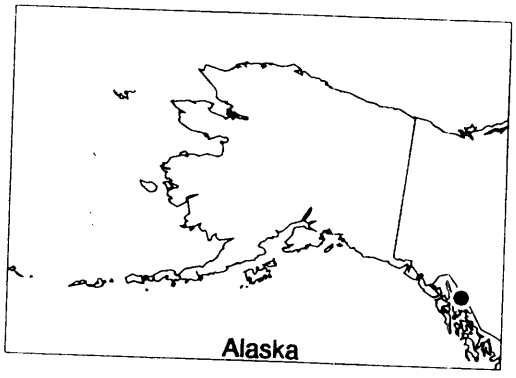
Hawaii Department of Health
Local sugar and tourist industries
Maui County
National Oceanic and Atmospheric Administration
U.S. Environmental Protection Agency

Contact:

Wendy Wiltse
Hawaii Department of Health
c/o Lahaina Comprehensive Health Center
1837 Honiapiilani Highway
Lahaina, HI 96761
(808) 669-7571

Figure 11:
A Phase I Inventory of Current EPA Efforts to Protect Ecosystems
Region 10 Project Locations





Area included in 1 or more of the large-scale projects (see Part 1 project summaries)

Reference point for local-scale project

State Boundary

Scale 1:6,500,000
Albers Equal Area Projection
Sources: US EPA (various)
Compiled January 1995, MR#00014-10/10
Area boundaries and reference point locations are approximate.

Region X Projects

Example projects submitted by Region X include the 17 projects listed below, plus its large-scale initiatives (see Part I) and place-based activities related to many of the multisite projects (see Part III). The map at left indicates the location and distribution of the large-scale and local-scale projects in this Region.

The Region's projects vary in size, in the types of ecosystems considered, in the types of partners involved with EPA, and in their goals. All are based on watersheds of various types, including the basins surrounding rivers, bays, and sounds. Declining anadromous fish stocks, channel alteration, riparian zone degradation, habitat fragmentation, increased sediment and water temperature, excessive water withdrawals, toxics, endangered species issues, heavy metals, reduced recreational uses, silvicultural and grazing impacts, and exotic species impacts are reported among the problems these projects seek to address. Actions taken include developing partnerships with a variety of local, state, and federal agencies, industries, private citizens' groups, and other organizations. Depending upon the environmental problems present, these multiorganizational teams might identify and assess important or degraded habitats; sponsor needed research; monitor and analyze loading rates, pollutant sources, and options for pollution prevention; propose development or revision of water quality standards; develop outreach and educational programs; or jointly develop management plans. Many of the local-scale projects also will enhance as well as benefit from the large-scale initiatives in the Region, which include the Interior Columbia River Basin Ecosystem Project, the Pacific Northwest Ecosystem Management Research Initiative, and the President's Forest Plan.

Region X projects in the Inventory at this time include:

Bear River, ID, UT, WY*
Chehalis River, WA
Clark Fork-Pend Oreille Watershed, ID, MT, WA*
Coeur D'Alene Basin, ID
Coos Bay/Coquille River Basins, OR
Duck Creek, AK
Grande Ronde River Basin Project, OR
Klamath Basin, CA, OR*
Kootenay River, ID, MT, British Columbia*
Lake Roosevelt, WA
Middle Snake River, ID
Pacific Northwestern Watershed Economic Valuation Project, WA
Puget Sound Estuary, WA
Tillamook Bay, OR
Willamette River Basin, OR
Willapa Bay Watershed Project, WA
Yakima River, WA

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* indicates projects that involve land in more than one EPA Region. Projects that extend across Regional boundaries are summarized under each Region in which they occur.

Bear River

Size and location: Bear River has a 19,700-square-kilometer (7600-square-mile) watershed located in Wyoming, Utah, and Idaho.

Nature of EPA involvement: EPA has provided technical assistance, funding, and participation in coordination committees.

Organization that initiated project:
Utah Division of Water Resources

Major environmental problems:

- Soil erosion, increased sediment loadings, coliforms, and high nutrient loadings due to animal feeding operations, dairies, urban development, roads, oil and gas exploration, and silviculture
- Riparian vegetation removal
- Stream channelization
- Degraded stream channels and stream banks

Actions taken or proposed: Interest in increasing the use of the river as a drinking water source for the growing urban population in the lower basin and along the Wasatch Front prompted the Utah Legislature to enact the Bear River Development Act and fund a Bear River water development and management plan. The effort is to address both water development and water quality issues with a water quality plan that includes a broad-reaching analysis of pollutant loading to the river as well as chemical, biological, and physical habitat assessments. Because the Bear River encompasses Utah, Wyoming, and Idaho, a regional planning effort has been initiated. The purpose of the regional effort is to share information, coordinate planning efforts, and promote "grass roots" direction and participation. The Bear River Watershed Water Quality Coordination Committee is coordinating an array of water projects in the Bear River Basin initiated by different organizations.

For example, the State of Utah, EPA, and the U.S. Department of Agriculture (USDA) initiated a watershed restoration project on the Little Bear River (one of the major tributaries in the basin), using funds from USDA and EPA. The project includes stream channel and riparian habitat restoration, land management, and animal waste treatment actions. Now underway in Wyoming are several additional nonpoint source projects aimed at restoring tributary streams that have been impacted by channelization, stream bank modification, and riparian habitat loss.

These "on-the-ground" demonstration projects are helping to generate enthusiasm for more cooperative efforts.

Stakeholders:

Bear Lake Regional Commission
Bear River Resource Conservation and Development Council
Idaho Division of Environmental Quality
Idaho Fish and Game Department
Local citizen groups
Natural Resources Conservation Service
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Division of Water Resources
Utah Division of Wildlife Resources
Utah Power and Light
Wyoming Department of Environmental Quality
Wyoming Game and Fish Department

Contact:

Barbara Russell
Bear River Resource Conservation and Development Council
1260 N. 200 East, Suite 4
Logan, UT 84321
(801) 753-3871
FAX: (801) 753-4037

Chehalis River

Size and location: The Chehalis River has a 6840-square-kilometer (2660-square-mile) drainage basin, located midway along the western Washington State coast. This includes the entire Chehalis River watershed, minus the Grays Harbor estuary.

Nature of EPA involvement: EPA has provided funding for various projects within the Chehalis River basin.

Organization that initiated project:
Chehalis River Council (CRC)

Major environmental problems:
- Bacteria
- Temperature
- Dissolved oxygen
- Siltation
- Suspended sediments
- Phosphorus

Actions taken or proposed: A plan has been developed and is in place for protecting and restoring the Chehalis River basin. Funding to implement the plan is currently being sought. Actions to be taken once funding has been obtained include:
- An economic feasibility study for a biowaste processing facility to remove waste streams. Tri-County Bio-Products, a group of dairy farmers, and other interested citizens and agricultural interests will manage the study.
- Ground water monitoring studies of areas affected by fecal coliform and nitrates. The county is already doing some work on this.
- Education and outreach to teach people about environmental problems and their relationship to ecosystems.

Actions that have already been taken or are under way in the Chehalis River Basin include:
- A nonpoint source pollution plan was completed by consensus of river basin users in December 1992.
- The Chehalis Basin Resources Alliance—a nonprofit organization not eligible for tax-deductible gifts—was formed for fund raising and grant application for CRC.
- The Chehalis Basin Resource Trust—a nonprofit organization eligible for tax-deductible gifts, easements, and bequests—was formed.
- Washington Department of Ecology (Ecology) is performing a total maximum daily load study of the middle Chehalis River and Black River, a tributary, and began a wasteload allocation process in fiscal year 1994.
- Ecology (with EPA funding) has developed a proposal to use the Chehalis River system to test a trading scheme between point and nonpoint sources to improve water quality.
- Dillenbaugh Creek Model Watershed project was begun by the Lewis County Conservation District.
- A basinwide private well water testing program is under way through Centralia College.

The Chehalis Basin Fisheries Task Force, a nonprofit group, is developing and implementing a $20 million fisheries (salmon and steelhead) restoration plan for the Chehalis River Basin. The U.S. Fish and Wildlife Service funded 21 projects (primarily habitat restoration) in fiscal year 1992, some of which were completed in fiscal year 1993.

Stakeholders:
Agricultural interests
Chehalis Basin Fisheries Task Force
Chehalis River Council
Cities and counties in the basin
Columbia/Pacific Resource Conservation and Development
Confederated Tribes of the Chehalis Reservation
Conservation districts
Environmental groups
Fish Growers Association
Fisheries interests
Grays Harbor Conservation District

Indian tribes in the basin including the Quinault Indian Tribe and the Chehalis Indian Tribe
Lewis County Cattlemans Association
Lewis County Conservation District
Timber interests
U.S. Fish and Wildlife Service
U.S. Forest Service
Universities
Washington Department of Ecology
Washington Environmental Council
Washington State Department of Fisheries
Washington State University Cooperative Extension

Contact:

Dave Palmer
Chairman
Chehalis River Council
P.O. Box 586
Ockville, WA 98568
(206) 273-8117

Clark Fork-Pend Oreille Watershed

Size and location: The Clark Fork-Pend Oreille Watershed covers 67,000 square kilometers (26,000 square miles) in Montana, Idaho, and Washington.

Nature of EPA involvement: EPA has provided funding and technical support for various projects in the watershed.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Nutrients from sources including irrigated agriculture, septic tanks, and municipal and industrial wastewater discharges
- Heavy metals from active and inactive mining and smelting activities

Actions taken or proposed: Section 525 of the 1987 Clean Water Act called for a comprehensive study of the sources of pollution in Pend Oreille Lake, the Pend Oreille River, and the Clark Fork River and its tributaries. Such an undertaking has required help from three states, two EPA Regions, and the EPA Las Vegas Environmental Monitoring Systems Laboratory.

Using a range of technological tools, the study of the rivers feeding Lake Pend Oreille was linked with an analysis of the lake by a project team made up of the U.S. Geological Survey, the University of Idaho, the Panhandle Health District, the Eastern Washington University, the Bonner County Planning and Development Department, the Idaho Department of Environmental Quality, the Idaho Department of Fish and Game, and the EPA Las Vegas Environmental Monitoring Systems Laboratory.

Objectives of the project include:

- Control nuisance algae in the Clark Fork River and Pend Oreille River by reducing nutrient concentrations.
- Protect Pend Oreille Lake water quality by maintaining or reducing current rate of nutrient loading from the Clark Fork River and Pend Oreille River.
- Reduce near shore eutrophication in Pend Oreille Lake by reducing nutrient loading from local sources.
- Improve Pend Oreille Lake water quality through macrophyte management and tributary nonpoint source controls.

Actions include:

- Convene a Tri-State Implementation Council to implement the management plan recommendations.
- Establish a basinwide phosphate detergent ban.
- Establish numeric nutrient loading targets for the Clark Fork River, Pend Oreille River, and Pend Oreille Lake.
- Develop and maintain programs to educate the public on its role in protecting and maintaining water quality.
- Control Eurasian milfoil (a nuisance plant) by education, rotovation (a harvesting technique), and research into alternative methods of control.
- Install centralized sewer systems for developed areas on Pend Oreille Lake.
- Institute seasonal land application and other improvements at the Missoula wastewater treatment facility.
- Enforce existing regulations and laws consistently and aggressively, particularly state anti-degradation statutes.
- Establish and maintain a basinwide water quality monitoring network to assess effectiveness and trends and to better identify sources of pollutants.
- Develop and enforce storm water and erosion control plans and county ordinances.

In addition, Idaho received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Lake Pend Oreille and its watershed. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

In 1993, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate

the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to a lake.

Stakeholders:

City of Butte
City of Deer Lodge
City of Missoula
City of Newport
Clark Fork Pend Oreille Coalition
Clean Lakes Coordinations Council
Idaho County Commissions
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Implementation Council
Intermountain Forest Industry Association
Intermountain Resources
Kalispill Indian Tribe
Kootenay Tribe of Idaho
Local citizens
Missoula City, County Health Department
Montana County Commissions
Montana Department of Fish, Wildlife and Parks
Montana Department of Health and Environmental Science
Montana Power Company
Pend Oreille Conservation District
Steering Committee for the Tri-State Implementation Council
Natural Resources Conservation Service
Stone Container
U.S. Environmental Protection Agency
U.S. Forest Service
University of Idaho
Washington Department of Ecology
Washington Department of Environmental Quality
Washington Water and Power

Contacts:

State:
Gary Ingman
Montana Department of Health and Environmental Sciences
Water Quality Bureau
Cogswell Building
Helena, MT 59620
(406) 444-5320
FAX: (406) 444-1374

Local:
Ruth Watkins
Clark Fork-Pend Oreille Tri-State Implementation Council
206 N. 4th Ave., Suite 157
Sand Point, ID 83864
(208) 265-9092

Coeur D'Alene Basin

Size and location: The Coeur D'Alene Basin encompasses 9583 square kilometers (3700 square miles) in Idaho.

Nature of EPA involvement: EPA has provided funding and technical assistance for studies in the Coeur D'Alene Basin.

Organizations that initiated project:

Idaho Department of Environmental Quality
U.S. Environmental Protection Agency
Coeur D'Alene Tribe

Major environmental problems:

- Heavy metals contamination
- Eutrophication
- Threatened water supply

Actions taken or proposed: Because of the many agencies involved in the restoration efforts for Coeur D'Alene Basin, a Steering Committee was created to oversee the basin restoration and policies regarding basin restoration activity.

One major source of basin contamination is the South Fork of the Coeur D'Alene River, which was identified as a water-quality-limited segment. Therefore, the State of Idaho must develop a total maximum daily load (TMDL) for both the point sources and nonpoint sources in the basin. Another major source of basin contamination is the Bunker Hill Superfund Site. Contamination at this site is being addressed through the Superfund remedial action process. The remedial actions implemented and resulting monitoring data will provide information that can help evaluate clean-up strategies.

Stakeholders:

Agricultural interests
Benewah County
Coeur D'Alene Basin Interagency Group
Coeur D'Alene Tribe
Idaho Department of Environmental Quality
Idaho Department of Land Management
Idaho Department of Water Resources
Idaho Fish and Game
Kootenay County
Kootenay Environmental Alliance
Local citizens
Mining interests
Natural Resources Conservation Service
Panhandle Health District
Shoshone County
Three soil conservation districts
Timber interests
U.S. Bureau of Indian Affairs
U.S. Bureau of Land Management
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
University of Idaho

Contact:

Geoff Harvey
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur D'Alene, ID 83814
(208) 769-1422

Coos Bay/Coquille River Basins

Size and location: The Coos Bay and Coquille River Basins are located along the southern part of the Oregon coast.

Nature of EPA involvement: EPA has provided technical assistance and contributed funding for watershed plan development, and participates with other organizations in working groups.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Degraded salmonid spawning gravel areas
- Overgrazing of riparian corridors
- Bank erosion
- Elevated water temperatures
- Degraded commercial shellfish beds
- High bacteria loadings
- High rates of juvenile salmon mortality
- Toxics contamination

Actions taken or proposed: State and local interests have recognized the major environmental threats listed above for some time. In many instances, individual actions had already been planned or initiated, but the level of effort and necessary teamwork were not nearly adequate to address the magnitude of the problem. EPA approached the lead state agencies to attempt a more integrated watershed approach.

Stakeholders:

County Department of Economic Development
Local drainage district
Oregon Department of Agriculture
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Soil Conservation District
U.S. Environmental Protection Agency

Contact:

Mike Rylko
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1200 Sixth Avenue
Seattle, WA 98101
(206) 553-4014
FAX: (206) 553-1775

Duck Creek

Size and location: Juneau, Alaska - 6.4 kilometers (4 miles) long.

Nature of EPA involvement: EPA has provided financial and technical assistance.

Organizations that initiated project:

National Marine Fisheries Service
Alaska Department of Environmental Conservation

Major environmental problems:

- Salmon habitat, riparian, and wetlands degradation
- Low water flows and hydrologic discontinuities
- Stormwater runoff
- Iron; bacteria
- Toxics, primarily from the airport
- Urban development

Actions taken or proposed:

- Extensive monitoring
- Comprehensive watershed planning
- Developing best management practices (BMPs) for dealing with snow removal
- Systematic replacement of problem culverts
- Public education and involvement in monitoring and riparian restoration
- Annual stream cleanup

Stakeholders:

City and Borough of Juneau
Fishing groups
Local businesses
Local residents
Several federal and state agencies

Contact:

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U.S. EPA Region X (WD-139)
1200 Sixth Avenue
Seattle, WA 9810
(206) 553-1566

Grande Ronde River Basin Project

Size and location: The Grande Ronde Watershed covers approximately 12,950 square kilometers (5000 square miles) in northeastern Oregon and southeastern Washington.

Nature of EPA involvement: EPA has provided financial and technical assistance and assistance in developing and implementing public involvement projects, as well as serving as a participant in several interagency/stakeholder teams for specific issues and resource protection/restoration projects.

Organization that initiated project: Numerous organizations initiated numerous projects and ecosystem efforts in the basin; no clear lead.

Major environmental problems:

- Habitat degradation of salmon species listed under the Endangered Species Act (ESA)
- Very high water temperatures throughout the basin
- Low water flows and hydrologic discontinuities in some critical areas
- Wetlands, wet meadows, and riparian degradation
- High nutrients and sediment from agriculture, grazing, and forestry

Actions taken or proposed:

- Total maximum daily loads (TMDLs): one on temperature; one on nutrients, DO, pH, ammonia
- Extensive monitoring
- ESA recovery and habitat conservation planning
- Stormwater management planning
- Comprehensive watershed planning for various portions of the basin
- Implementation of agriculture and forestry best management practices (BMPs)
- Riparian, wetland, and in-stream restoration
- Public education and involvement in protection/restoration projects
- Water conservation practices

Stakeholders:

Environmental groups
Farmers and ranchers
Local businesses
Local government
Native American tribes
Numerous federal and state agencies
Timber industry

Contact:

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1200 Sixth Avenue
Seattle, WA 98101
(206)553-1566

Klamath Basin

Size and location: The Klamath Basin ecosystem covers an area of 20,700 square kilometers (8003 square miles) in south-central Oregon and northwestern California. In Oregon, the basin covers 14,700 square kilometers (5676 square miles) primarily in Klamath County, with smaller areas in Jackson, Josephine, and Lake Counties. Three river systems in the Upper Klamath Basin discharge to Upper Klamath Lake, including the Wood, Williamson, and Sprague Rivers. The Upper Klamath Lake is a large, shallow lake (36,360 hectares/90,000 acres, 2.4-meter/7.9- foot average depth).

Nature of EPA involvement: EPA has provided the following grants: a 319(h) grant for agricultural best management practice implementation in high-priority tributary watersheds and establishment of a comprehensive geographic information system (GIS) watershed data base (with training and equipment for use at local level; Clean Lakes Water Quality Assessment grant funds for the Klamath Tribe Fish and Wildlife Section to complete a water quality study of Upper Klamath Lake; 104(b)(3) total maximum daily load (TMDL) mini-grant for TMDL development and staff; and 319 grants that fund state staff working intensively in the basin. EPA staff have provided technical assistance in the development of watershed assessments related to FEMAT (the President's Forestry Initiative), coordinating cross-state communication.

Organizations that initiated project:

The Klamath Tribe
U.S. Fish and Wildlife Service

Major environmental problems:

- Habitat degradation resulting in the listing of two endangered species—Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*)
- Water quality degradation and degradation of wildlife habitat caused by traditional forestry practices including large areas of clear-cuts
- Declines in anadromous fish populations including the chinook salmon due to elevated temperature, sedimentation, and blockage of migration pathways
- Excessive upstream withdrawals, resulting in low river flows over the past several years
- Diversion of 61,650 hectare-meter (500,000 acre-feet) of water in the Upper Klamath Basin to irrigate 90,900 hectares (225,000 acres) of hay, potatoes, and sugar beets
- Loss of wetlands to agricultural uses (a conversion that has been linked to water quality and riparian degradation and wildlife habitat destruction)
- Point source discharges
- Questionable application of toxic chemicals, including pesticides, that have the potential to affect salmonids, endangered species (fish and wildlife), and nontargeted aquatic invertebrates

Actions taken or proposed: The Department of the Interior has formed the Klamath Basin Ecosystem Restoration Office. This office is staffed by both the Bureau of Reclamation and the U.S. Fish and Wildlife Service and is based in Klamath Falls, Oregon. The Bureau of Land Management purchased the Wood River Ranch, a significant land acquisition adjacent to the Wood River at the north end of Agency Lake.

A Technical Advisory Committee (TAC) has been formed to discuss and evaluate all studies currently under way in the Klamath Basin. TAC members include federal, state, and local agency personnel.

Several state and federal agencies have initiated an investigation of the application of toxic chemicals, including pesticides, that have the potential to affect salmonids, endangered species, and aquatic invertebrates.

Stakeholders:

Bureau of Land Management
Bureau of Reclamation
City of Klamath Falls plus other point source dischargers
Hunting groups
Klamath Tribe
Local ranchers/farmers

Nonconsumptive resource users
Several tribes in California
Sport and commercial fishing interests
Timber interests
U.S. Fish and Wildlife Service

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Kootenay River

Size and location: The watershed of the Kootenay River covers 49,000 square kilometers (19,000 square miles) in northwestern Montana, northern Idaho, and British Columbia.

Nature of EPA involvement: EPA provided funding for data collection in the watershed, an Adopt-A-Stream project, and to hire of a professional facilitator.

Organization that initiated project:
Cabinet Resource Group

Major environmental problems:
- Threats from silviculture, hydropower, mining, and pulp mills
- Protection of species of special concern (white sturgeon and bulltrout)

Actions taken or proposed: The Kootenay River Network (KRN) has been formed and is composed of federal, state, tribal, provincial, industry, and citizen group representatives who are interested in the Kootenay River basin. The mission of the KRN is to involve stakeholders in the protection and restoration of the chemical, physical, and biological integrity of the waters of the Kootenay River basin. The goals are:
- Improve communication among government and tribal water resource management agencies and public and private interests for British Columbia, Idaho, and Montana.
- Pursue coordination of efforts and standardization of methods.
- Develop and implement a basinwide water quality monitoring program.
- Fully use monitoring information to accomplish proactive, scientifically based water resources management.
- Educate the public and solicit information about water resources issues.

EPA, the Bonneville Power Administration, Noranda Minerals, and Champion International funded the *Water Quality Status Report* (January 1994), which provides a history and description of the Kootenay River basin; discusses current water quality issues, development activities, and aquatic resources in the basin; gives an overview of past, present, and potential future environmental issues and problems in the basin; and makes recommendations for prioritizing the basin's water quality concerns and critical issues.

The KRN also received funding to have Adopt-A-Stream Foundation conduct a workshop to train 20 citizen volunteers in stream monitoring methods and implement a monitoring program. These volunteers, called Streamkeepers, are to train others as well. The KRN has also received funding for a professional facilitator.

Stakeholders:
British Columbia Ministry of Environment
Cabinet Resource Group
Champion International
East Kootenai Environmental Society
Idaho Department of Fish and Game
Idaho Division of Environmental Quality
Kootenay National Forest
Kootenay Tribe of Idaho
Kootenay Tribes of British Columbia
Montana Department of Fish, Wildlife, and Parks
Montana Department of Health and Environmental Sciences
Noranda Minerals Corps
Panhandle National Forest

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Lake Roosevelt

Size and location: Lake Roosevelt, located in north-central Washington, has a surface area of about 324 square kilometers (125 square miles).

Nature of EPA involvement: EPA has provided project and financial management.

Organizations that initiated project:

U.S. Environmental Protection Agency
Washington State Department of Ecology
Local citizens

Major environmental problems:

- Metals contamination in fish tissues and lake sediments
- Chlorinated dioxin and furan compounds in fish tissue
- Point source discharges

Actions taken or proposed: Findings of metals and dioxin contamination in sediment and fish, followed by fish consumption advisories, led local citizens to press Congress to appropriate funds to EPA to develop a water quality management plan for Lake Roosevelt. Ultimately, Congress provided over $1 million for the project and EPA dedicated additional funding. Funds have been used for sediment analyses; fish tissue analyses; retrospective studies of watershed characteristics, fisheries, limnology, and toxic contaminations; limnological work; fish consumption surveys; public involvement; and development of a management plan.

Stakeholders:

Boise Cascade, Kettle Falls
British Columbia Ministry of the Environment
Citizens for a Clean Columbia
Colville Confederated Tribes
Environment Canada
Ferry County Commissioners
Lake Roosevelt Water Quality Council
Lake Roosevelt Forum
Lake Roosevelt Property Owners Association
Lincoln County Commissioners
National Park Service
Spokane Tribe
Stevens County Commissioners
Tri-County Health Department
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Washington Association of Wheat Growers
Washington Department of Ecology
Washington Department of Health
Washington Department of Wildlife
Washington Water Research Center

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Middle Snake River

Size and location: The Middle Snake River is located in the Snake River Plain in south- central Idaho.

Nature of EPA involvement: EPA Region X and EPA Headquarters' Office of Water and Office of Policy, Planning and Evaluation are working together with the state and other stakeholders on a watershed ecological risk assessment and a total maximum daily load for nutrients. Both of these activities are being integrated with the state's development of a nutrient management plan and other management activities.

Organizations that initiated project:

U.S. Environmental Protection Agency
State of Idaho
Middle Snake River Study Group (MSRSG)

Major environmental problems:

- Threatened water quality
- Aquatic ecosystem degradation
- Runoff
- Effluent
- Riparian/wetland habitat degradation
- Endangered and threatened species
- Loss of recreational resources

Actions taken or proposed: In 1988, EPA became concerned about cumulative impacts to the Middle Snake River from existing and proposed hydroelectric projects. As a result, EPA initiated an ecological risk analysis of this portion of the Snake River that uses both measurements and models to estimate the likelihood of deleterious changes in the watershed.

In 1990, the State of Idaho designated parts of the Middle Snake River as water quality-limited, thereby requiring the establishment of a total maximum daily load. The state then developed a Nutrient Management Plan (NMP). Input from industry, environmental groups, and local government will aid in defining a pollutant load limit that achieves water quality standards and specifies a clearly enforceable allocation of allowable pollutant loadings among the various dischargers.

Local officials also became aware of the water quality problems in the Middle Snake River and formed the Middle Snake River Study Group (MSRSG). The MSRSG has completed a draft Coordinated Water Resource Management Plan for the Middle Snake River. The integration of these three efforts (NMP, ecological risk analysis, and MSRSG plan) is providing a coordinated approach to addressing water quality problems in the Middle Snake River.

Stakeholders:

B&C Energy, Inc.
City of Twin Falls
Clear Springs Trout Company
Cogeneration, Inc.
Dairy and feedlot owners and operators
Hagerman Valley Citizens Alert, Inc.
Idaho Aquaculture Company
Idaho Cattle Association
Idaho Conservation League
Idaho Dairymen's Association
Idaho Department of Fish and Game
Idaho Department of Parks and Recreation
Idaho Division of Environmental Quality
Idaho Power Company
Idaho Rivers United
Idaho Whitewater Association
L.B. Industries
Middle Snake River Study Group (elected officials and citizens from four counties)
North Side Canal Company
Rangen, Inc.
Twin Falls Canal Company
Twin Falls County Parks Department
U.S. Environmental Protection Agency

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Pacific Northwestern Watershed Economic Valuation Project

Size and location: Yet to be chosen by Region X.

Nature of EPA involvement: EPA's Office of Policy, Planning and Evaluation (OPPE) might fund development of integrated ecosystem and economic models of the watershed for the purposes of integrated watershed management. As a starting point, OPPE will transfer the models developed in the Patuxent River Watershed Project to the selected watershed in Region X. EPA would use this model in its process of watershed coordination. It would potentially use the model as a process and tool to involve stakeholders in developing a sustainable future for the watershed.

Organization that initiated project:

EPA - Office of Policy, Planning and Evaluation

Major environmental problems: The models will be designed to evaluate the ecological and economic effects and benefits of various environmental problems. These include agricultural runoff of nutrients, wetland protection, and restoration.

Actions taken or proposed: None yet.

Stakeholders:

EPA Region X and by extension the stakeholders of the specific watershed.

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Puget Sound Estuary

Size and location: The Puget Sound Estuary and its watershed cover several thousand square miles in Washington State in the area bordering British Columbia in Canada.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in the Management Committee of the program.

Organizations that initiated project:

U.S. Environmental Protection Agency
State of Washington
Puget Sound Water Quality Authority

Major environmental problems:

- Loss of fish and wildlife habitat
- Nonpoint source pollution
- Contaminated sediments
- Diminished biological resources
- Diseased and chemically contaminated fish
- Contaminated (by bacteria) and closed shellfish beds

Actions taken or proposed: Puget Sound was selected for inclusion in EPA's National Estuary Program in 1987. A Comprehensive Conservation and Management Plan was drafted that recommends priority corrective actions to restore and maintain the water quality and biological resources of the sound. This plan was revised and updated in 1989, 1991, and 1994.

Stakeholders:

Native American tribes
Numerous large and small environmental groups

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Tillamook Bay

Size and Location: Tillamook Bay is a large, shallow estuary along the north coast of Oregon. Its watershed covers 147,380 hectares (364,800 acres). Five major rivers—Miami, Kilchis, Wilson, Trask, and Tillamook—drain the watershed.

Nature of EPA involvement: In accordance with the National Estuary Program, EPA has provided funding and technical and programmatic support and has participated in the Policy, Management, and Advisory Committees of the program.

Organizations that initiated project: A variety of groups in Tillamook County and the Oregon Department of Environmental Quality asked the Governor of Oregon to nominate Tillamook Bay for EPA's National Estuary Program (NEP). There has been strong local involvement in the project's conception and implementation.

Major environmental problems:

- Fecal coliform contamination
- Animal wastes from agricultural activities
- Bacterial contamination from dairy animal waste
- Habitat loss and sedimentation, which are threatening anadromous fisheries (summer steelhead, spring/fall chinook, and one of few remnant chum salmon populations in the state)
- Possible sedimentation problems if future logging activities are not carefully conducted

Actions taken or proposed: Tillamook Bay was selected for inclusion in the NEP in 1992. A Comprehensive Conservation and Management Plan that will recommend priority corrective actions to restore and maintain the estuarine resources of the bay is being developed.

The Methane Energy and Agricultural Development Project, an effort to collect animal waste from dairies to produce electricity, soil amendments, and fertilizer products, has been initiated.

Stakeholders:

Commercial/recreational fisheries
Environmental groups
Logging industry
Methane Energy and Agricultural Development
National Marine Fisheries Service
Natural Resources Conservation Service
Oregon Departments of:
Agriculture; Environmental Quality; Fish and Wildlife; Forestry; Health; Land, Conservation, and Development; and State Lands
Oyster/clam industries
Residents
Soil and Water Conservation District
Tillamook Bay and Garibaldi Port Districts
Tillamook County
Tillamook County Creamery Association
Tillamook County Economic Development Committee
Tillamook Sanitation Technical Advisory Committee
Tourism industry
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
USDA Farm Service Agency
USDA Forest Service

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Willamette River Basin

Size and location: The Willamette River basin is located in Oregon and covers 29,785 square kilometers (11,500 square miles). Within the basin are more than 8,050 kilometers (5,000 miles) of rivers and tributaries.

Nature of EPA involvement: EPA has provided technical assistance for restoration projects, contributed significant funding for watershed plan development, and participates with other organizations in working groups.

Organizations that initiated project: A number of local, state, and federal groups are working to align their efforts.

Major environmental problem:

- Development pressures

Actions taken or proposed: EPA is developing several strategic work plans for the Willamette River basin. These work plans include:

- Riparian and aquatic habitat restoration targeting and implementation
- Applying sustainability concepts and approaches
- Environmental justice through reduction of toxic exposure risks
- Drinking water protection through a pollution prevention strategy

All work plans include field-level demonstration projects.

EPA is working with a variety of local, state, federal, and private groups to develop new technical approaches for reconciling conflicts between land use and the management of terrestrial and aquatic biodiversity.

Federal Forest Ecosystem Management Plans are being developed for the "key watersheds" on federally owned forest lands within the Willamette River basin. More than a dozen "key watersheds" have been designated within the basin. Watershed analysis for restoration work began in 1994.

Oregon is developing state policies and processes for fostering greater local stewardship through inter-agency communication and the formation of local basin councils.

Six communities within the Willamette River basin are developing comprehensive wetland protection plans. Total maximum daily loads are being developed in a number of subwatersheds.

Many local and basinwide networks have been or are being formed in response to changes in social and land use development patterns and the corresponding effects on resource management options.

Stakeholders:

Local citizens
Local Soil and Water Conservation Districts
Multiple state agencies
Natural Resources Conservation Service
Pacific Rivers Council
The Nature Conservancy
U.S. Environmental Protection Agency - Corvallis Research Lab

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Willapa Bay Watershed Project

Size and location: The Willapa Bay watershed covers 389 square kilometers (150 square miles) in southwestern Washington.

Nature of EPA involvement:

- A Region X second-tier priority watershed
- Several Near Coastal Waters targeted on Nonpoint Source (NPS) issues

Organizations that initiated project:

EPA Region X, Water Division, Watershed Section

Major environmental problems:

- Coliform bacteria in rivers and bay from sewage and agricultural sources
- Forest, wetland, and marine habitat degradation caused by logging, diking, and other activities
- *Spartina* invasion resulting in the obliteration of salmon, crab, benthic, eel grass habitat
- Application of carbaryl to control burrowing shrimp populations

Actions taken or proposed:

- Comprehensive watershed planning
- Implementation of agriculture best management practices (BMPs)
- Development of pest management plans for shrimp and *Spartina*
- Assisting local groups in restoration and stewardship projects

Stakeholders:

Oyster industry
Dairy and beef farmers
Commercial and recreational fishermen
Timber companies

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Yakima River

Size and location: The Yakima River basin is located in south-central Washington and drains an area of 15,941 square kilometers (6155 square miles).

Nature of EPA involvement: EPA has provided technical assistance and contributed funding for watershed plan development, and participates with other organizations in working groups.

Organization that initiated project:
Yakima Valley Conference of Governments

Major environmental problems:
- Altered temperature, pH, and in-stream flows
- Habitat loss and degradation
- Fecal coliform
- Fish populations including salmon, other aquatic life, and recreational uses at risk

Actions taken or proposed: A Water Quality Management Plan that includes basin characterization and problem identification, a basin and subbasin action plan, and technical appendices has been completed for Yakima Basin. Future work will center on action plan implementation and local government and public involvement/participation.

Stakeholders:
Agricultural, development, and timber interests
Bonneville Power Administration
Concerned citizens
Environmental interests
State and local government
U.S. Environmental Protection Agency
Yakima Indian Nation

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Part Three: Summaries of Multisite Ecosystem Protection Projects and Programs

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Summaries of Multisite Ecosystem Protection Projects and Programs

This third category of projects was added to the Inventory because many submitted projects that were place-based and ecosystem-oriented did not seem to fit the large-scale or local-scale categories' focus on a single place. Generally, these projects conduct the same kind of ecosystem protection activity at several different sites scattered across a region or the whole nation. Beyond the significance of the activity at each site, these projects are important to the Inventory because many of them represent programs that have already demonstrated that they can accommodate an ecosystem protection approach.

A single project summary represents each multisite project or program in lieu of repetitive summary forms for every individual site. Some of these programs involve dozens or even hundreds of place-based projects. In a few cases, some of the best examples of local-scale projects under these multisite programs also appear under the local-scale part of this Inventory.

The multisite projects in the Inventory at this time include:

Biodiversity/Habitat Assessment Project
Clean Lakes Program
Ecosystem Management Strategy for Compliance and Enforcement
EPA New England Regional Lead Initiative
GATF Northwestern Riparian Zone Assessment and Restoration Project
Gulf Ecological Management Sites
Louisiana Coastal Wetlands Project
Mississippi River Compliance Initiative
Multimedia Project
Multi-Resolution Land Characteristics Consortium (MRLC)
Oak-Savanna Ecosystem Project
OECA/OC Watersheds Initiative
Pacific Salmon Habitat Recovery Project
Rocky Mountain Headwaters Mining Waste Initiative
Targeted Watersheds Project
TMDL (Total Maximum Daily Load) Case Studies
Watershed Ecological Risk Assessment Program
Wetlands Advance Identification Program
Wetland Restoration Research Project

Biodiversity/Habitat Assessment Project

Type of sites and locations: Pilot studies are going on in Oregon, Pennsylvania, California, Washington, Idaho, and the states bordering Chesapeake Bay. Many of the analyses are prototypes being developed for national application at this stage. Also, the project has ecosystem/watershed research in the four watersheds draining through Camp Pendleton, California, has completed research on Monroe County, Pennsylvania - Poconos, and is initiating a regional-level assessment in the Mojave Desert.

Nature of EPA involvement: In recognition that loss of biological diversity can be effectively addressed only through cooperation of vested interests, EPA has formed a biodiversity research consortium to develop the technical information and data bases needed to assess and manage risks to biodiversity. Initially, membership in the consortium includes EPA, U.S. National Biological Survey (USNBS), U.S. Department of Agriculture (USDA), Forest Service, U.S. Department of the Interior (USDI) Geological Survey, U.S. Department of Defense (DOD), Bureau of Land Management (BLM), and The Nature Conservancy. Additional organizations will be added, much as the "Partners in Flight" consortium has been created for neotropical migratory birds.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems: Traditionally, the management of biodiversity has focused on rescuing rare, threatened, or endangered species from the brink of extinction. Huge sums of money have been spent on recovery programs for a small number of species. While there are strong conservation arguments for preserving these species, the effort expended has been out of proportion to the contribution that these species make to the genetic diversity, and therefore the fitness of the biota as a whole to adapt to environmental stress.

The Habitat/Biodiversity Research Program invokes a new risk-based paradigm for identifying those areas that have species assemblages which contribute the greatest genetic diversity to the biota of their biogeographic regions and then managing those areas to sustain biodiversity. The paradigm is implemented in two stages and at two greatly different spatial scales. First, priorities for management action are identified by comparative risk assessment across spatially extensive biogeographic regions. This permits cost-effective targeting of more intensive diagnostic and remediation efforts, allows accurate evaluation of the many species that have extensive geographic distributions, and avoids the pitfall of instituting protection at the local level, only to have cumulative effects of actions in the surrounding landscape undermine these efforts. Secondly, specific remedial action plans are developed and implemented at a finer spatial scale (i.e., ecological subregions within a state) than the comparative risk assessment. At this scale, landscape-level management approaches are needed. Attention will be directed to ameliorating the adverse effects of habitat fragmentation, reducing other forms of anthropogenic stress, restoring habitat, and evaluating the land management trade-offs required to sustain biodiversity.

Actions taken or proposed: Initially, the consortium proposes to categorize and map the species diversity and environmental diversity of each of about 12,000 sampling units (hexagons) based on the Environmental Monitoring and Assessment Program (EMAP) sampling grid covering the conterminous United States. The process will include:

- Compilation of The Nature Conservancy's detailed vertebrate species distribution and attribute data for each hexagon.
- Compilation by hexagon of attributes of environmental diversity from remotely sensed land characterization data (AVHRR, TM, or MSS based, depending on results of pilot studies).
- Analysis of the species and land characterization data by different ecological weighing methods, spatial analyses, multivariate statistical pattern analyses, and protection optimization methods.

This information, along with stressor data compiled from existing data bases (TIGER;

USGS LUDA; USDA-NASS, ERS, NRI, FIA; USDI BLM) will be evaluated and synthesized to quantify relative risks to biodiversity by region and landscape type. Overall patterns that lead to high importance and vulnerability of natural landscapes and biodiversity will be identified. Benefits include:

- Establishment of baseline conditions concerning species distributions and their relationships with environmental diversity.
- Comparative risk assessment for biodiversity, which identifies priorities for attention by the diversity of public and private land managers whose coordinated efforts will be necessary to sustain biodiversity.
- Testing of methods that hold promise for significantly reducing costs of habitat monitoring, evaluation, and management.

Stakeholders:

Land Resource Management Agencies
U.S. EPA

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Clean Lakes Program

Type of sites and locations: Over 600 Clean Lakes Program grants have been awarded to 49 states and 18 Native American tribes since 1976. These grants have been made for the four purposes outlined below.

(1) Lake Water Quality Assessments - Provide general support for state/tribal lakes programs.
(2) Phase I Diagnostic-Feasibility Studies - Define the problems in a lake through an assessment of the lake and its watershed and determine the most feasible plan for lake ecosystem restoration.
(3) Phase II Implementation Projects - Implement recommendations of the Phase I study, which can include watershed nonpoint source pollution control methods and in-lake ecosystem restoration measures.
(4) Phase III Post-Implementation Monitoring Studies - Support a scientific analysis of various in-lake and watershed management activities to determine their long-term effectiveness for restoration and/or protection of the lake ecosystem.

The lakes that are targeted for Clean Lakes projects are based on a state priority list and criteria outlined by the Clean Lakes Program Regulations (40 CFR Part 35, Subpart H, February 5, 1980), the Clean Lakes Program Guidance (December 1987), and an annual program implementation memorandum.

Nature of EPA involvement: The Clean Lakes Program is administered by the Office of Water's Office of Wetlands, Oceans and Watersheds, Assessment and Watershed Protection Division, Watershed Branch. Clean Lakes funds are transferred to the Regions, which enter into cooperative agreements with the designated state water quality agencies. The state may then enter into sub-state agreements with local agencies, universities, and others to implement the project. The Regional Clean Lakes Coordinator acts as project officer on each project. The level of EPA involvement varies with each project, but generally the day-to-day project activities are carried out at the state or local level. One of the principles of the Clean Lakes Program that has proven to be an element of long-term project success is that there is a high level of local support and involvement in the project.

Organization that initiated program: The Clean Lakes Program was established by Congress under the 1972 Federal Water Pollution Control Act.

Major environmental problems: The information that was reported by the states in their 1992 section 305(b) reports indicates that the five leading causes of impairment to lakes include metals, nutrients, organic enrichment/dissolved oxygen depletion, siltation, and priority organic chemicals. Although metals were reported to impair the greatest number of lake acres nationally, over 50 percent of these lake acres were reported in one state (Minnesota). More states reported problems from nutrients than any other single pollutant. Nutrients cause nuisance overgrowth of algae as well as aquatic vegetation, which can lead to oxygen depletion via plant respiration and microbial decomposition of plant matter. Thirty states reported that siltation impairs their lakes, ponds, and reservoirs. Siltation can smother aquatic organisms and their habitats, damage gills in fish and other aquatic organisms, and gradually fill in lakes. Priority organic chemicals increased in relative importance as a lake pollutant from the 1990 305(b) reports. The sources of these pollutants were reported to be primarily agricultural activities (56 percent). Other sources of pollutants were urban runoff and storm sewers, hydrological and habitat modification, municipal point sources, and onsite wastewater disposal.

Actions taken or proposed: The Clean Lakes Program will continue to offer financial assistance (as available) to the states to address these problems. The states are encouraged to leverage other funding sources to help address lake ecosystem problems. The Clean Lakes Program will also continue to offer technical assistance through guidance documents on restoring and managing lakes and support for conferences and

workshops on a wide variety of lake management issues.

Stakeholders: Participation in Clean Lakes Program projects has included EPA and other federal agencies including the U.S. Department of Agriculture, the Corps of Engineers, the Tennessee Valley Authority, and the Department. of the Interior. Forty-nine state and numerous local water quality agencies, 18 Native American tribes, community groups, universities, private businesses, and citizens have also played roles in Clean Lakes projects.

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Ecosystem Management Strategy for Compliance and Enforcement

Type of sites and locations: No specific sites designated as yet. Some places are planned as part of the strategy development.

Nature of EPA involvement: The Office of Enforcement and Compliance Assurance (OECA) is planning to develop a strategy for Ecosystem Management in Compliance and Enforcement. This strategy is being designed to complement and support the Agency-wide efforts on place-based or ecosystem management and will identify compliance and enforcement activities for ecosystem protection and improvement. In addition, some pilot activities are planned particularly in conjunction with the focus on the Mississippi River and the Water Enforcement Division's initiatives on watersheds and fish consumption advisories.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Endangered species
- Ecological impacts from releases to the environment
- Contaminated fish
- Fish kills
- Wetlands and habitat losses

Actions taken or proposed: A major need is for more comprehensive compliance and enforcement approaches for ecosystem protection. Examples of ecosystem protection and improvement opportunities using compliance and enforcement include the following:

- Better use of SEPs for ecosystem protection and restoration in resolution of past violations.
- Ecosystem protection from agricultural impacts by using localized bulletins, advisories, and label restrictions.
- Endangered species protection.
- Establishing compliance assistance centers for various sectors of the regulated community and providing outreach with clean-up information to groups of pollutant releasers.
- Identifying areas where more requirements are needed.

Stakeholders:

Agricultural groups and interest
Environmental Conservation and Recreation groups
EPA Regions
Farmers
Industry
Public
State and local governments
Other federal agencies

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EPA New England Regional Lead Initiative

Type of sites and locations: New England Region including the States of Connecticut, Massachusetts, Maine, New Hampshire. Rhode Island, and Vermont.

Nature of EPA involvement: Developing and implementing a regional strategy in partnership with state and local governments, community groups, and grassroots organizations that focuses on education and outreach, monitoring and mapping, training, state and federal coordination, and enforcement. Certain facets of regional activities have place-based components, such as the examples listed below.

Organization that initiated project:
EPA New England

Major environmental problem: In EPA New England's comparative risk analyses, lead was one of the top three environmental health threats facing New England. The 1990 Census indicates more than 51 percent of New England housing stock was built prior to the 1978 ban on lead in paint, suggesting this housing might contain lead-based paint, as do residential soils surrounding homes where exterior lead-based paint was used.

Actions taken or proposed:

- Established in November 1992 and continuing support to the New England Lead Coordinating Committee (NELCC) quarterly meetings composed of State health and environmental contacts and representatives as well as representatives from Department of Housing and Urban Development, U.S. Public Health Service, and Occupational Safety and Health Administration.
- Award grants to community-based organizations for lead poisoning prevention education in high-risk communities.
- Education and outreach to day care centers and English as a second language programs throughout New England under way.
- Pilot training and economic development project at Roxbury Community College linking high-risk communities with lead professions training and job opportunities.
- Develop and conduct intensive lead source data collection and mapping project in East Providence in conjunction with the City of East Providence and Rhode Island Department of Health. Plot products and software support provided to partner communities.

Stakeholders:
Children under six most affected by lead, particularly children in low-income and minority communities
Homeowners and tenants
Parents of children, families
State health and environmental agencies

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GATF Northwestern Riparian Zone Assessment and Restoration Project

Type of sites and locations: Project includes several medium to large watersheds in Oregon, Washington, and Idaho known to be high-priority river systems for restoration of cold-water aquatic communities and in particular their historically significant wild salmon stocks. The rivers are the Grande Ronde (OR), John Day (OR), Yakima (WA), Umpqua (OR), Imnaha (OR), Tucannon (WA), Lolo Creek (ID), and Asotin Creek (WA). These areas were selected after consulting with several federal and state agencies and the Columbia River Tribes to identify their high-priority waterbodies.

Nature of EPA involvement: This is an EPA-led multiagency project. The EPA project is one of eight programs in eight civilian agencies funded through the Department of Defense's Environmental Program, Government Applications Task Force (GATF). At the direction of Congress, this program's purpose is to use advanced technologies to provide improved support to environmental missions of several federal agencies.

Organization that initiated project:

EPA Office of Water, Office of Wetlands, Oceans and Watersheds

Major environmental problem: One of the biggest ecological problems in the watersheds of the Pacific Northwest is overwarming of waterbodies due to removal of the shade-producing riparian (streamside) vegetation that keeps streams cool. Temperature stress results in failure to attain state water quality standards protective of cold-water biota in many rivers throughout the region. Due to multiple adverse effects, including the effects of elevated water temperature, an immediate threat faces Pacific salmon populations in their spawning grounds. In fact, water temperatures of 25 °C (77 °F) can be lethal to adult salmon, and other life cycle stages experience lethal or sublethal effects at even lower temperatures. The American Fisheries Society assessed over 400 wild salmon stocks throughout the Pacific Northwest in 1991 and found most of them under moderate to high risk. Some streamside forestry and grazing practices reduce or eliminate shade, resulting in water temperatures that can be harmful or lethal to the salmon populations. Nevertheless, ecological restoration techniques can restore shade and management practices that retain shade, and stable banks are increasingly being applied on public lands and some private lands near these rivers. As grazing, forestry, and agricultural uses also occur within the study watersheds, solutions to the problems in each waterbody will require assessing the interrelationship of the terrestrial and aquatic characteristics of the ecosystem and identifying the most compatible management strategies.

Environmental managers across this region, however, are not well equipped to monitor, quantify, assess, and remediate such widespread problems. It is a scientific and socioeconomic challenge to determine where the temperature problems are, what reaches are affected and how severely, what the probable causes are in each location, what remedies are available, and where best to restore riparian zones and instream habitat in different watersheds and geographic settings.

Actions taken or proposed: Although not a panacea, the integrative analysis techniques of remote sensing and geographic information systems (GIS) have the potential to assist state and federal agencies in ecological assessment, restoration planning, and management, where data on large areas are needed in a relatively short time frame. The projects at each of the eight river systems will use remote sensing and GIS technology to perform screening-level modeling and assessment of the likelihood of temperature impairment and will combine these findings with a closer look at the location of critical habitat features and potential riparian restoration sites. Modeling will support evaluation of "what if" management scenarios involving different patterns of terrestrial vegetation and land use activity in and near the riparian zone and the potential effects of these scenarios on the aquatic systems. These analyses will provide greater understanding of the exposure to

GATF Northwestern Riparian Zone Assessment and Restoration Project

temperature stress from sub-basin to sub-basin and will provide GIS-based assessment data to help set priorities for ecological restoration projects that will be widespread in the Northwest over the next few years. In doing this, the project will also contribute to the information base for determining combinations of multiple uses in northwestern forested watersheds that might be compatible and sustainable in the long term.

Stakeholders: Direct participation in the project has included EPA, U.S. Forest Service, U.S. Army Corps of Engineers, the State of Oregon, the Environmental Research Institute of Michigan, and the Columbia River Tribes. A much broader assortment of stakeholders, public and private, are also involved with related watershed analysis and management activities in these watersheds.

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Gulf Ecological Management Sites

Type of sites and locations: The Gulf of Mexico abuts five Gulf Coast states and has a surface area of 1,631,700 square kilometers (630,000 square miles) and a U.S. coastline length of almost 2,737 linear kilometers (1,700 linear miles).

Nature of EPA involvement: Funding assistance for all Gulf of Mexico Program activities associated with this initiative; providing technical input via steering committees, meetings, and workshops; and promotion of the Gulf Ecological Management Sites (GEMS) concept to other federal and state agencies.

Organization that initiated project:
Gulf of Mexico Program

Major environmental problems:
- Habitat degradation
- Impairment of wetland functions
- Impaired habitat for rare or endangered species

Actions taken or proposed: In June of 1991, representatives from state and federal agencies, nonprofit organizations, and private industry first met to outline the strengths and weaknesses of coastal management initiatives and identify action items that would help develop the role of the Gulf of Mexico Program in the GEMS concept.

The GEMS concept aspires to bring an awareness of and support to these special areas via the power of multiagency endorsement and participation. Such endorsement is essential in establishing the level of public awareness and support necessary to encourage local, state, federal, and corporate entities to seek out and leverage existing mechanisms or create innovative alliances. Such a process works through the concepts embodied by sustainable development.

This process served as a catalyst for the establishment of the Graveline Bayou and Grand Bay Coastal Preserves by the Mississippi Bureau of Marine Resources (BMR). The Nature Conservancy and the U.S. Fish and Wildlife Service assisted BMR in the acquisition of and development of management plans for these areas.

In February of 1993, federal, state, and private organizations established a framework under which the GEMS concept will be carried out. GEMS coordinators for each of the five Gulf states, tasked to take the lead in compiling a list of prospective sites within their state, were identified.

In September of 1993, the site identification and compilation phase was initiated. In conjunction with this phase, a data base system was established to manage and evaluate information compiled for these sites.

Stakeholders:
Environmental organizations
National Oceanic and Atmospheric Administration
Other cooperating agencies
State governments in Florida, Alabama, Mississippi, Louisiana, and Texas
U.S. Air Force
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Louisiana Coastal Wetlands Project

Type of sites and locations: Approximately 1.3 million hectares (3.3 million acres) of tidally influenced fresh, brackish, intermediate, and saline wetlands in 19 parishes in Louisiana.

Nature of EPA involvement: The Administrator of EPA is designated by the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) as one of six Task Force members (along with the Secretaries of Army, Commerce, Interior, and Agriculture and the Governor of Louisiana) to develop a comprehensive plan for restoration of coastal Louisiana wetlands and to "carry out" restoration projects. The act also requires EPA to administer a grant to Louisiana to develop a State Conservation Plan.

Organization that initiated project: Congress enacted Public Land 101-646 (CWPPRA) in November 1990. The legislation was initiated by the Coalition to Restore Coastal Louisiana in conjunction with Senators Breaux and Johnston.

Major environmental problems: These wetlands, which constitute about 40 percent of the estuarine wetlands in the lower 48 states, are being lost at rate of about 65 square kilometers (25 square miles) per year. Human activities such as the construction of levees, dams, and navigation channels; drainage for development and agriculture; and natural subsidence of the Mississippi River delta contribute to the losses occurring.

Actions taken or proposed: The Restoration Plan calls for significant changes in management of the Mississippi and Atchafalaya Rivers to increase sediment and freshwater input and restart natural processes of land building and maintenance. Projects are identified to reverse hydrologic modifications by rebuilding barrier island chains and controlling tidal flows through large navigation channels. Specific projects include freshwater and sediment diversions, shoreline protection, hydrologic restoration, and vegetative plantings.

Stakeholders:

Commercial and recreational fishermen
Eco-tourism
Hunters and trappers
Include the human populations that depend on wetlands to provide a buffer from hurricanes and other storms
Industries such as oil/gas, chemical
Landowners
Seafood consumers

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Mississippi River Compliance Initiative

Type of sites and locations: Various sites within the Mississippi River basin. Locations not known at this time.

Nature of EPA involvement: The Agriculture and Ecosystem Division in the Office of Enforcement and Compliance Assurance (OECA) is reviewing problem areas and authorities for resolving problems in the Mississippi River basin. The purpose of this review is to identify ecosystem protection and improvement opportunities in the Mississippi River compliance activities.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Impacts from concentrated animal feeding operations
- Contaminated fish advisories
- Fish kills
- Impacts from agricultural activities
- Wetland losses

Actions taken or proposed: OECA is collecting information and evaluating problem areas and authorities in order to focus on activities on a smaller geographical basis within the basin where enforcement and compliance can have positive effects on ecological protection and improvement.

The Office of Regulatory Enforcement within OECA has initiated a plan for case initiatives in the Mississippi River basin in response to an invitation by 17 U.S. Attorneys in the Mississippi River basin area for EPA to become involved in enforcement actions in the basin.

Stakeholders:

Agricultural groups and interests
Environmental Conservation and Recreation groups
EPA Regions
Farmers
Industry
Public
State and local governments
Other federal agencies

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Type of sites and locations:

North Carolina
- Albemarle Sound
- Pamlico River
- Core Sound

Maryland
- St. Martin River
- Chincoteague Bay

Nature of EPA involvement: EPA initiated the project, recruited the participants, coordinates their activities, participates in sample collection, and performs chemical analyses of biological, water, and sediment samples in-house in the laboratories of EPA's Atmospheric Research and Exposure Assessment Laboratory (AREAL). AREAL, the Environmental Monitoring and Assessment Program (EMAP), and participating investigators and agencies have all supported the project.

Organizations that initiated project:

EPA Atmospheric Research and Exposure Assessment Laboratory, Quality Assurance and Technical Support Division, Analytical Materials and Support Branch

Organic Analysis Section

Major environmental problems: Coastal and estuarine ecosystems are among the most productive of ecological systems. Historically, more than 70 percent of commercial and recreational landings of fish, shellfish, and crustaceans have been taken from estuaries. In the past quarter-century, slow deterioration of water quality in such ecosystems and the increasing prevalence of diseased organisms have been observed.

Crustaceans, including the commercially important blue crab (*Collinectes sapidus*), are commonly affected by pollutants, overharvesting and habitat changes. Observations from preliminary research studies as well as fishermen's accounts show an increase in the prevalence of shell disease syndrome in blue crabs. This disease has been associated with stressed environments, such as intensive aquaculture, impounded populations, and polluted natural environments. It can be experimentally induced by exposure to sewage sludge, pesticides, or heavy metals, suggesting its potential as a useful biomarker of environmental degradation.

Actions taken or proposed: EPA's Atmospheric Research and Exposure Assessment Laboratory is conducting a project to assess the feasibility of using various measures of the health of the Atlantic blue crab as indicators of environmental stress. The project will attempt to develop baseline biological data using shell histopathology and immune functions of blue crabs that might be rationalized by paralytic chemical analyses of tissues and other media.

Stakeholders:

AREAL
CDS Analytical
Chesapeake Bay Program
Duke University
EMAP
Gulf of Mexico Program
EPA Regions III, IV, and VI
Delaware
Maryland
North Carolina Marine Research
North Carolina State University
Other estuarine monitoring efforts
Versar Inc.

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Multi-Resolution Land Characteristics Consortium (MRLC)

Type of sites and locations: Conterminous United States

Nature of EPA involvement: Coordinating agency

Organizations that initiated project: EPA's Environmental Monitoring and Assessment Program (EMAP); the U.S. Geological Survey's National Ambient Water Quality assessment (NAWQA), Eros Data Center (EDC), and North American Landscape Characterization (NALC); and the National Oceanic and Atmospheric Administration's Coastal Change Analysis Program (CCAP)

Major environmental problems: Project provides geographic information system (GIS) data useful for assessment of a wide variety of ecological problems.

Actions taken proposed: Natural resource (land cover/land use) mapping for United States; development of a national archive of multiscale imagery and derivative products.

Stakeholders:

EDC
EMAP
CCAP
NAWQA
GAP
NALC

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Oak-Savanna Ecosystem Project

Type of sites and locations: The oak-savannas and open oak woodlands of the Midwest are among the world's most threatened communities. At one time, prior to European settlement, oak-savanna and woodland communities occupied a significant portion of the Midwest, probably from 11 million to 13 million hectares. Approximately 17-20 percent of the Midwest oak-savannas remain; however, most are highly degraded as a result of timber harvesting, overgrazing, agricultural use, fragmentation, and fire suppression. Oak-savannas extended from Canada through Minnesota, Wisconsin, Illinois, Indiana, Ohio, Michigan, Iowa, Missouri, Kansas, Oklahoma, and Texas.

Nature of EPA involvement: EPA cooperated with the Universities of Wisconsin-Stevens Point and Northeastern Illinois and The Nature Conservancy to sponsor a conference on the ecosystem. The conference had two purposes: first, to bring the scientific community together to debate the issues regarding the viability of the system, the species included, and the steps necessary for recovery; and, second, to develop and circulate a draft recovery plan for the oak-savanna system. The draft recovery plan has been shared and revised based experience in the field and scientific analysis. Another revision will be available at the September 1995 Savanna Conference in St. Louis, Missouri.

Organization the initiated project: EPA Region V, Planning and Management Division, working with The Nature Conservancy and the University of Wisconsin-Stevens Point and North Eastern Illinois University. Support for the effort came from all of the Divisions and Program Offices within Region V.

Major environmental problems:

- Loss of biological diversity
- Significant lose of grassland birds
- Soil erosion
- Increased flooding in the area of the ecosystem
- Exotic species

Actions taken or proposed: A recovery plan for the oak-savanna ecosystem has been drafted and has been used by practitioners for over a year. Based on their experiences, the recovery plan has been revised. Another revision will also be made available at the Savanna Conference planned for September 1995 in St. Louis, Missouri. The region is also planning to meet with the leading scientist and the agency partners to establish a vision for the ecosystem and to establish goals and objectives. The team will then decide on the initiatives that will be undertaken and what each team member can contribute.

Stakeholders: U.S. Fish and Wildlife Service, U.S. National Park Service, U.S. National Biological Survey, U.S. Forest Service, Department of Defense, States of Illinois, Indiana, Minnesota, Michigan, Ohio, Wisconsin, Iowa, and Missouri, Ontario, Canada, The Nature Conservancy, volunteer stewards, and many local governments.

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OECA/OC Watersheds Initiative

Type of sites and locations: As yet undesigned

Nature of EPA Involvement: The Office of Enforcement and Compliance Assurance's (OECA) Water Enforcement Division and Office of Compliance (OC) are working together to develop a permitting, compliance assistance, and enforcement strategy to apply the Agency's various regulatory authorities, in conjunction with outreach, in a concerted effort to prevent and/or remediate pollution in various watersheds. EPA hopes this strategy will be used by the Regions and states in setting priorities for FY96 and will support and build on existing efforts at watershed protection.

Organizations that initiated the project:

OECA and EPA's Office of Water (OW)

Major environmental problems: Depending upon the watershed identified, problems might include some of the following:

- Nonpoint source pollution
- National Pollutant Discharge Elimination System (NPDES) violations
- Permits that are not sufficiently stringent
- Deposits from air emissions
- Combined sewer overflows, storm sewer overflows, or sludge problems
- Hazardous waste storage or disposal violations
- Misuse of pesticides
- Inability to consume fish or use water for drinking and/or recreation

Actions taken or proposed:

- Identification of measurement criteria for identifying troubled watersheds
- Expedited issuance or reissuance of permits
- Compliance assistance
- Public information and outreach
- Enforcement (both administrative and judicial)
- Statutory or regulatory changes

Stakeholders:

Local communities
Regulated public
States and Regions

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Pacific Salmon Habitat Recovery Project

Type of sites and locations: All of Oregon, Washington, and Idaho; major portions of western Montana and northern California.

Nature of EPA involvement: Full partner; major emphasis on aligning fishery and environmental agencies' authorities and programs for maximum salmonid benefit, particularly in improving protection of critical aquatic and riparian habitat. EPA will play key roles on both the Habitat and Hydropower subcommittees.

Organization that initiated project: Office of Environmental Policy (White House), with lead agency responsibilities resting with National Marine Fisheries Service (NMFS).

Major environmental problems: Our wild Pacific Northwest salmon are crashing toward extinction. A growing list of at least 314 stocks of salmonids (81 chinook, 98 coho, 6 sockeye, 28 chum, 6 pink, 89 steelhead, and 5 sea-run cutthroat) are at risk within western Washington, western Oregon, and northern California alone.

This decline is symbolic of the pervasive decline of all forms of aquatic biodiversity regionwide. The vast majority of the region's river systems are significantly degraded by water quality and quantity problems, and all watersheds suffer from significant "ecosystem simplification," causing not just the loss and degradation of freshwater habitats, but critical aquatic food chain problems as well.

No one agency can reverse this decline. Authorities and resources are both incomplete and fragmented across all levels of government. Even worse, many agencies have priorities that run counter to salmon survival.

Actions taken or proposed: An Interagency Memorandum of Agreement has been signed by seven key federal agencies; implementation is under way. The Pacific Salmon Coordinating Committee has been established. Interagency subcommittees are now being established to coordinate key issues (i.e., habitat, hatcheries, hydro, and harvest). Interagency teams are also being considered for five major ecoregions (Washington Coast, Oregon Coast, Columbia River, and northern California.) NMFS has proposed to expand planned status review of nine endangered salmon stocks to include comprehensive status assessment of all Pacific salmonids.

Stakeholders: Everyone. It is almost impossible to find any Pacific Northwest interest (public, private, or parochial) that will not be affected by this effort. Protecting the salmon will require fundamental, and extremely difficult, changes in how people value and use the water resources in the Pacific Northwest.

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Rocky Mountain Headwaters Mining Waste Initiative

Type of sites and locations: The mineralized regions of the Rocky Mountains.

Nature of EPA involvement: EPA Headquarters has provided funding to Region VIII for this geographic initiative. Regional staff provide oversight to the research, remediation, coordination, and public involvement projects funded by the Initiative. Staff are often directly involved in the design and implementation of projects. Staff also work in multiprogram, multiagency efforts to address issues identified by the initiative objectives that are not necessarily funded projects.

Organization that initiated projected: The water Quality Branch of EPA Region VIII began the initiative. Projects funded by the initiative were begun by universities, other federal and state agencies, municipalities, and watershed groups.

Major environmental problems: Heavy metals contamination of thousands of miles of Rocky Mountain streams due to the remains of past mining activities at thousands of sites, and threats from current and proposed mining activities.

Actions taken or proposed: Using the watershed framework of the Initiative, EPA has improved participation by stakeholders as well as the multiprogram, multiagency approach to addressing mined sites within a geographic area. EPA has developed a partnership network across the mineralized Rocky Mountains to share technology, data, experiences, and resources and improve policies to restore water quality. EPA has also developed biological indicators for metal impacted sites and is developing screening methodologies. Site characterization and remediation at mined sites throughout the region have led to improved understanding of what needs to take place before remediation of targeted mined areas within defined watersheds. EPA has also experimented with and demonstrated several types of passive remedial technologies and is beginning to develop knowledge about their usefulness under certain scenarios.

Stakeholders: Partnerships with the following organizations have been developed through joint outreach, research, and remediation projects:

- Blackfoot Chapter of Trout Unlimited
- City of Golden
- City of Idaho Springs
- Clark Fork Pend Oreille Coalition
- Clear Creek County
- Clear Creek Forum
- Colorado Division of Minerals and Geology
- Colorado Division of Wildlife
- Colorado Nonpoint Source Task Force
- Colorado School of Mines
- Colorado State University
- Colorado Water Quality Control Division
- Coors Brewing Company
- Kootenay River Network
- Montana Water Quality Bureau
- Northwest Colorado Council of Governments
- Sangre de Cristo Resource Conservation and Development Council, Inc.
- San Juan County
- Salt Lake County
- South Dakota State University
- State of Idaho
- Sunnyside Mining Company
- The Nature Conservancy
- U.S. Bureau of Land Management
- U.S. Bureau of Mines
- U.S. EPA Region X
- U.S. Forest Service
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- Volunteers for Outdoor Colorado

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Targeted Watersheds Project

Type of sites and locations: The Targeted Watersheds Project consists of four watershed restoration projects located throughout the State of Maryland. The watersheds are the Sawmill Creek (122 square kilometers/8.5 square miles of mostly urban area) in Anne Arundel County, the Bird River (68 square kilometers/26 square miles) of future growth area with some current mining activities) in Baltimore County, the Piney/Alloway Creeks (154 square kilometers/ 59.3 square miles of mostly dairy farming and feed-growing areas) in Carroll County, and the German Branch (50.5 square kilometers/19.5 square miles) of mostly agricultural, row-cropped land) in Queen Anne's County.

Nature of EPA involvement: EPA has provided funding through section 319 of the Clean Water Act; and also has conducted regional training workshops for biological monitoring.

Organization that initiated project:

Maryland Department of Natural Resources

Major environmental problems: The purpose of the Targeted Watershed Project is to demonstrate the effectiveness of coordinating multi-agency resource management programs, on a watershed basis, to restore typical streams leading to the Chesapeake Bay. The project addresses problems of nonpoint source pollution through its activities.

Actions taken or proposed: Baseline water quality assessments have been published for each watershed thus far. Restoration education programs are underway. In urban watersheds, several projects have been constructed to improve habitat; several major ones (channel and riparian habitat reconstruction and pollutant control) are about to begin. In the two agricultural watersheds, there has been a high level of farmer cooperation, new best management practice (BMP) construction, and nutrient management plan implementation. Trend monitoring and restoration programs are continuing.

Stakeholders:

State of Maryland:

- Chesapeake Bay Trust
- Department of Natural Resources
- Department of the Environment
- Department of Agriculture
- Department of Transportation
- Local Governments and Soil Conservation Districts of Queen Anne's, Baltimore, Carroll,and Anne Arundel Counties and Adams County, Pennsylvania
- Maryland Governor's Office (Bay Workgroup)

U.S. Government:

- Department of Agriculture
- EPA
- Fish and Wildlife Service
- Geological Survey
- National Oceanic and Atmospheric Administration

Private:

- Alliance for the Chesapeake Bay
- Chesapeake Bay Foundation volunteers
- Sawmill Creek Watershed Association
- Save Our Streams

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TMDL (Total Maximum Daily Load) Case Studies

Type of sites and locations: Over 500 TMDLs have been initiated for waterbodies in 47 states since 1992, and over 225 have been completed and approved. The Case Studies involve 13 TMDLs, in scattered locations throughout the United States, that are unusually progressive in their whole-watershed analysis perspective, use of new technologies or methods, and attention to protecting and restoring aquatic ecosystems.

Nature of EPA involvement: EPA generally administers the Clean Water Act, and the section 303(d) TMDL program, as a state-delegated program with some federal oversight. EPA reviews and approves TMDLs developed by states or tribes and has provided technical assistance or funding to aid the development of specific TMDLs.

Combining TMDL development with other assessment and planning efforts such as resource management plans, basin plans, and watershed analyses is encouraged. For example, the Clean Lakes program (Clean Water Act (CWA) section 314) has coordinated its program requirements with the TMDL process so that assessments conducted under Phase 1 of the program may qualify as TMDLs. Analyses that qualify as a TMDL may be developed through activities such as CWA section 319 nonpoint source management programs and implementation projects, Lakewide Area Management Plans (LaMPs) in the Great Lakes, upcoming activities under section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA), watershed analysis/planning under the President's Forest Plan, other land management planning by federal or state land management agencies, water quality-based effluent limits (WQBELs), and ecological risk assessments.

Organization that initiated project:

EPA Office of Water, Office of Wetlands, Ocean and Watersheds, Assessment and Watershed Protection Division, Watershed Branch

Major environmental problem: Traditionally, TMDLs had been developed for chemical pollutants typically associated with point sources. More and more often, predominantly nonpoint pollution problems such as nutrients, ammonia, pH, and sediment have become the focus of many TMDLs as point source controls and improved technologies reduce the contribution of point sources to water quality problems in general. Because of the flexibility of the TMDL process, it is possible to develop TMDLs for nonchemical stressors such as temperature and habitat alteration as well as the more traditional pollutants. In these situations the methods used for reducing the loading may sometimes rely on ecological restoration.

Actions taken or proposed: TMDLs are required by the Clean Water Act for estimating the loading reductions necessary to meet water quality standards on an impaired waterbody and recommending control measures that will bring about this improvement. TMDLs are applicable to whole watersheds and waterbodies impaired by point sources only, nonpoint sources only, or a combination of both point and nonpoint sources, and are among the most flexible tools available for managing aquatic ecosystem quality. Section 303(d) and the TMDL process provide the legislative and scientific underpinnings for the Watershed Protection Approach.

As described in EPA regulations, a TMDL is defined as the sum of the individual wasteload allocations (WLAs) for point sources plus the sum of load allocations (LAs) for nonpoint sources plus a margin of safety (MOS). A reserve for future growth may also be included. The TMDL concept applies to any type of chemical, physical or biological pollutant or other stressor affecting the Nation's waterbodies. TMDLs span a wide range of sizes and levels of complexity, and although each TMDL will be unique to the waterbody and the stressor it addresses, TMDLs must possess certain basic elements to be approvable under CWA section 303(d). These common characteristics include being quantitative, model-based, focused on attaining water quality standards, and addressing all possible sources of a stressor.

Stakeholders:

States
Tribes
Other federal and EPA water programs are directly involved in TMDL development; the public, recreational users, landowners, and practically any other interests may be involved in the process or in implementing the plans to reduce loadings and reattain water quality standards.

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Watershed Ecological Risk Assessment Program

Type of sites and locations: Four watershed projects across the country are demonstrating how ecological risk assessment can add scientific rigor to management decisions and priority setting in watershed protection. Watersheds include Big Darby Creek, Ohio; Middle Platte River Wetlands, Nebraska; Snake River, Idaho; Waquoit Bay Estuary, Massachusetts; and Clinch River, Virginia.

Organization that initiated project:

U.S. Environmental Protection Agency in partnership with local government and private organizations, state regulatory and resource management agencies, and federal agencies

Major environmental problems:

- Changing land use patterns
- Habitat alteration and loss
- Point and nonpoint source pollution
- Overenrichment
- Hydrologic modification
- Sedimentation

Actions taken or proposed: Scientists and resource managers at the local, state, and federal levels, have formed volunteer partnerships in Big Darby Creek, Middle Platte River, Snake River, Clinch River, and Waquoit Bay to develop ecological risk assessments in these watersheds, (Descriptions of the watersheds are provided elsewhere in this document.) These partnerships are highly successful because each recognizes that establishing management priorities and options based on a science is essential to effective watershed management.

Each watershed partnership worked directly with the public, local and state resource managers, federal agencies, and private organizations to identify common goals for the watershed. The goals were then used to design the watershed risk assessment to ensure that the outcome of the assessment will directly assist stakeholders in making cohesive and effective decisions for their watershed.

In addition to providing examples of ecological risk assessments in four watersheds, the case studies will demonstrate how to improve the monitoring and assessment process, use scientific information more effectively in management priority setting, and maximize limited resources and data in watershed-level evaluations.

Guidance will be produced from this work that is appropriate for use at the local, state, and federal levels. The guidance will include information on how to conduct and use watershed ecological risk assessments to evaluate the relative and combined effects of human activities on watershed resources, and will provide a decision framework for selecting among management options to protect those resources.

Stakeholders:

Federal resource management agencies
Federal environmental protection agencies
General public
Industry
Local citizens groups
Private organizations
State environmental protection agencies
State resource management agencies

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Wetlands Advance Identification Program

Type of sites and locations: There are approximately 77 projects (both completed and ongoing) in EPA's Wetlands Advance Identification Program (ADID). ADID projects range in size from less than 40 hectares (100 acres) to greater than 10,360 square kilometers (4000 square miles) and are located from Alaska to Florida.

Nature of EPA involvement: ADID is an advance planning process under which EPA, in cooperation with the Corps of Engineers and after consultation with the state, may identify wetlands and other waters that are either generally suitable or unsuitable for the discharge of dredged and fill material prior to receipt of a Clean Water Act section 404 permit application. While an ADID study generally classifies wetland areas as suitable or unsuitable for the discharge of dredged or fill material, the classification does not constitute either a permit approval or a denial and should be used only as a guide by landowners and project proponents in the planning of future activities. The nature of this classification is strictly advisory.

Organization that initiated project: Program was created through amending Clean Water Act regulations during the mid-1980s.

Major environmental problems: Primary characteristics of areas chosen for ADID are the presence of wetlands of unusually high value or quality, an elevated likelihood of negative impacts upon those valued characteristics, and the resulting opportunity to provide general information and initiate dialogue in advance of specific permit applications.

Actions taken or proposed: The ADID process generally involves collection and distribution of information on the values and functions of wetland areas. This information provides the local community with information on the values of wetland areas that might be affected by their activities, as well as a preliminary indication of factors that are likely to be considered during review of a Section 404 permit application.

The ADID process is intended to add predictability to the wetlands permitting process as well as better account for the impacts of losses from multiple projects from within a geographic area. The process also informs the local population of the values and functions of wetlands in their area, and it generates environmental information valuable for other purposes. Individual ADID projects have been developed throughout the United States, as listed below:

REGION I
Lake Champlain Region Advance Planning Project
Leonard Pond Advance 404(c)
Southern Maine/York County ADID

REGION II
Hackensack Meadowlands

REGION III
Cedar Island, Virginia
Chincoteague Island, Virginia
Philipsburg/Moshannon Valley, Pennsylvania
Pocono ADID
Quakertown Swamp
Sussex County/Delaware Inland Bays

REGION IV
Carolina Bays ADID
Carteret County, North Carolina ADID
Central Dougherty Plain ADID
Florida Keys ADID
Huntsville Area ADID
Northeast Shark River Slough (East Everglades)
Pearl River - Jackson, MS ADID
Rookery Bay
Southwest Biscayne Bay ADID
St. John's Forest
West Broward County
West Chatham County
West Kentucky Coalfield

REGION V
DuPage County, Illinois
Grand Calumet River/Indiana Harbor Canal ADID
Green Bay Special Wetlands Inventory Study (SWIS)
Kenosha County ADID

REGION V (cont)
Kosciusko County ADID
Lake Calumet SAMP
Lake County, Illinois ADID (I)
Lake County, Illinois (II)
Rock Run ADID
SEWRPC Corridor ADID
Streetsboro Project
Western Ohio/Lake Erie ADID

REGION VI
Bolivar Flats
Faulkner Lake
Lower Pearl River
Upper Trinity River Basin

REGION VII
Rainwater Basin ADID Study

REGION VIII
Boulder ADID
Crested Butte, Colorado (Informal ADID)
Jackson ADID (Informal)
Missouri River Valley Project, North Dakota
Park County (Informal)
Salt Lake County (Jordan River ADID)
Snyderville Basin ADID
Telluride ADID

REGION IX
Santa Margarita River Watershed
Verde River

REGION X
Albany, Oregon Wetland Conservation Plan
Bainbridge Island Wetland Conservation Plan
Cannon Beach Wetland Planning Project
Clackamas County Wetlands Planning Project
Columbia South Shore Wetlands Management
Colville Delta ADID
Grants Pass, Oregon Wetlands Conservation Plan
Grays Harbor Estuary Management Plan
Homer ADID
Juneau ADID
Lincoln City Wetlands Planning Project
Mill Creek Drainage Basin SAMP
Prineville Wetlands Planning Project
Puget Sound Dredged Disposal Analysis Phase I
Puget Sound Dredged Disposal Analysis Phase II
Rockaway Beach Wetland Conservation Plan
Roseburg, Oregon Wetland Conservation Plan
Salem, Oregon Wetlands Conservation Plan
San Juan County Wetland Conservation Plan
Springfield Wetland Conservation Plan
Teton Valley Wetland Management Plan
Tigard Wetlands Planning Project
Toledo Wetlands Planning Project
Warrenton, Oregon Wetlands Conservation Plan
West Corvallis/Squaw Creek Wetlands Planning Project
West Eugene Wetland Conservation Plan

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Wetland Restoration Research Project

Type of sites and locations: Samples of populations of freshwater wetlands of various sizes in the Willamette Valley in western Oregon, east-central Pennsylvania, Connecticut, Puget Sound in western Washington, the Upper Arkansas watershed in Colorado, the San Luis Rey watershed in southern California, and the Prairie Pothole Region (PPR).

Nature of EPA involvement: EPA's Wetlands Research Program (WRP) is conducting studies to (1) evaluate the ecological performance of restored, created, and enhanced wetlands; (2) develop approaches for identifying and prioritizing sites for restoration; and (3) determine possible land use effects on the functions of wetlands.

Organization the initiated project:
EPA's Wetlands Research Program

Major environmental problems:

- Wetland loss
- Urbanization
- Impacts from mining and farming practices
- Hydrologic modification.

Actions taken or proposed: The Wetlands Research Program is (1) conducting the work in the Willamette Valley in Oregon; (2) cooperating in the design, data collection, and analysis for the Pennsylvania, PPR, and Connecticut studies; and (3) providing technical support as needed for the San Luis Rey, Upper Arkansas, and Washington studies. Studies in the San Luis Rey watershed are nearing completion. The studies in the Upper Arkansas, Oregon, and Pennsylvania are under way. The work in Connecticut, Washington, and the PPR is being planned. The study in Connecticut will be in the field in the spring of 1995. The study in the PPR will be in the field in the summer of 1996. The implementation of the field work for the Washington study is dependent on funding.

Stakeholders: Potential stakeholders include the Natural Resources Conservation Service (formerly Soil Conservation Service); the U.S. Fish and Wildlife Service; various state agencies; and conservation groups, such as Ducks Unlimited.

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